Machine and Tool

BLUE BOOK

JANUARY 1951

★

SPECIAL REPORT ON
MAPI REPLACEMENT FORMULA

★

Right File Cuts Filing Costs
High Efficiency at Norge-Chattanooga

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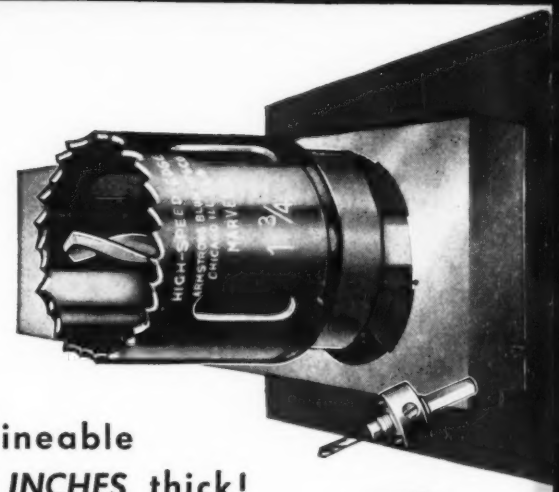
A HITCHCOCK PUBLICATION

ESTABLISHED 1906

Cut...



LARGE HOLES

. . . thru any machineable material up to *1⅛ INCHES* thick!

Here is a premium tool which makes it possible to saw holes in one short operation . . . large holes which heretofore had to be laboriously machined "a-chip-at-a-time."

MARVEL High-Speed-Edge Hole Saws have strength to withstand the terrific peripheral strains of heavy duty operation in lathes, drill presses or portable power tools. They have a high speed steel cutting edge which is electrically welded to a tough, alloy steel body, high speed steel pilot drills, heavy hexagonal shanked arbors and sufficient set for deep drilling. They are self-aligning, as the larger diameter saws float on their arbors and are driven by double drive pins. They will saw round holes accurately in any machineable material.

MARVEL High Speed-Edge Hole Saws come in 35 sizes, from ⅜" to 4½". They are carried in stock by leading industrial distributors.

WRITE FOR BULLETIN ST-49

"MARVEL" has Always had the edge!

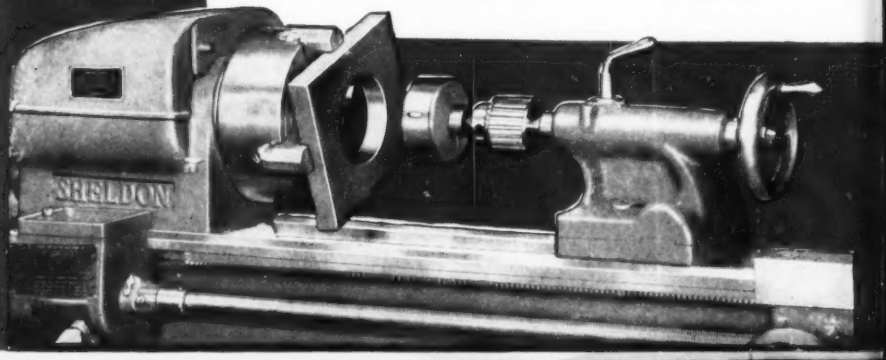
MARVEL *Metal Cutting* **SAWS**

Better Machines-Better Blades

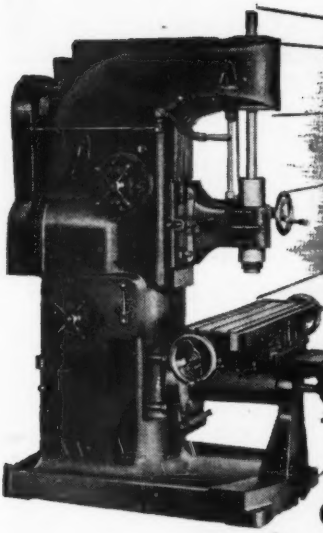
ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Avenue **Chicago 39, U. S. A.**



THE KNIGHT NO. 40



DOES THE WORK OF TWO OR MORE MACHINES

Here's Why-

1. A tilting, swivel table that entirely eliminates special jigs, angle plates and other expensive fixtures usually required for special or complicated milling, boring or shaping jobs.
2. Exceptional capacity and flexibility make it easy for the Knight No. 40 to do jobs which often require transfers to two or more special machines.
3. Sixteen table and spindle feed changes plus four vertical spindle feeds allow the use of a wide range of cutting tools.
4. Correctly located full vision controls for direction, speeds and feeds provide the most in convenient, simple operation.
5. Heavy, strong, one-piece column casting, wide accurate bearings and precision gearing insures the rigidity which means absolute accuracy and long service life.

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W.B.KNIGHT
MACHINERY COMPANY

KNIGHT VERSATILE POWER AT WORK

3920 WEST PINE BLVD.
ST. LOUIS 8, MISSOURI

ATTACH TO COMPANY LETTERHEAD

W. B. KNIGHT MACHINERY CO., 3920 West Pine, St. Louis

Send catalog on Knight No. 40 and other milling machines.

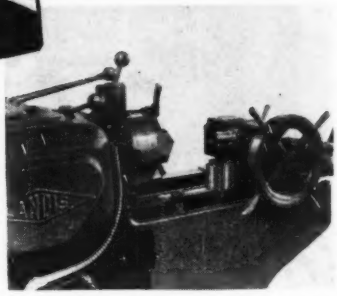
Name _____

Title _____

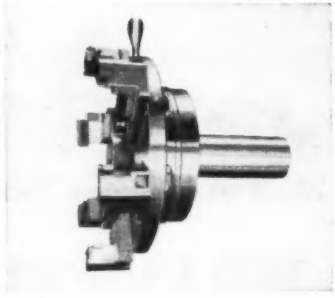
MORE GOODS for MORE PEOPLE at LOWER COST

A COMPLETE Thread Engineering SERVICE

- Product Design
- Process Development
- All Types of Threading Equipment
- Special Applications



A 1½" Single LANDMACO Machine equipped with special work holding fixture for threading adapter sleeves.



A Special Die Head (LANDMATIC 40AXX) designed and built to thread valve seat rings up to diameters of 14¾".

New and improved products often create unprecedented Threading Problems. The difficulty may be in designing a thread which will function properly as an operating part, or in producing a thread already designed.

Whatever the problem our Thread Engineering Service will help with advice and assistance — or undertake the solution alone. After thoroughly examining the problem, recommendations will be made on basic Thread Design, the Thread Production Process, and the Threading Equipment to be used. Often a difficult Thread Producion Problem can be solved by a slight change in Thread Design — occasionally a job requires special equipment — two such Special Equipment Applications, developed by our Engineering Department, are illustrated.

Whatever your Thread Problem, use our THREAD ENGINEERING SERVICE. Hundreds of manufacturers have been able to perform difficult threading operations efficiently and economically with Landis Threading Equipment. The years of Thread Experience and Engineering Know-How that has brought LANDIS to the fore in Thread Generating is at your service. May we help you?

LANDIS *Machine* CO. WAYNESBORO PENNA., U.S.A.

BALAS PUSHERS

Help Secure Maximum Production

OHIO SCREW PRODUCTS, INC.

SPECIAL AUTOMATIC SCREW MACHINE PRODUCTS ELYRIA, OHIO
810 CLARK STREET

Balas Collet Mfg. Company
1587 East 27th Street
Cleveland 14, Ohio.

Attn: Mr. John R. Cox - General Mgr.

Gentlemen:

During the past 18 months, we have been using a considerable amount of your heavy duty stock feed pushers of the squirrel cage type, and we are glad to tell you that we have had exceptionally good results from this type of pusher.

We show several instances of having been able to use this type of pusher in continuous production for a period of six months, and the minimum life we have encountered was approximately four months. This combined with the fact that we have had very little trouble with the pusher marking bars seems that it has helped us to secure maximum production from machines.

Yours very truly,

OHIO SCREW PRODUCTS, INC.

M. A. Hewitt - General Mgr.

MAH:JB

Here's Proof

How You, too, Can Eliminate Down-Time and Do Better Work...

Believe it or not...this is not an unusual record for Balas Products! Hundreds of equally well known manufacturers are getting more and better production at far lower costs with Balas Collets, Feed Fingers and "Martin" Master Collets. You, too, can increase the performance of your machines and eliminate "down-time" by specifying "Balas" when you order collets and pushers.

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Find out how Balas can save money for you. Send for price list and catalog!

Please send copy of New Balas Catalog and Price List

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COMPANY _____

ADDRESS _____

CITY _____ STATE _____

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TOOL HOLDERS . . .

for every operation!

There are ARMSTRONG TOOL HOLDERS in sizes and types for every operation on lathes, planers, slotters and shapers—for the heaviest cuts; for the most delicate cuts.

With Standard shaped cutters, bits and blades of ARMSTRONG HIGH SPEED, ARMALOY (Cast Alloy) and ARMIDE (Carbide-Tipped) they provide a system of tooling that assures maximum production per machine hour, lower tool costs, and higher machining profits.

These permanent multi-purpose tools can be picked up as needed from your industrial distributor. Use them wherever possible to increase number of pieces per hour, to lower cost per piece.

Write for Catalog.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5208 West Armstrong Ave., Chicago 30, Illinois

published monthly • vol. 47 no. 1

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OVER 5000

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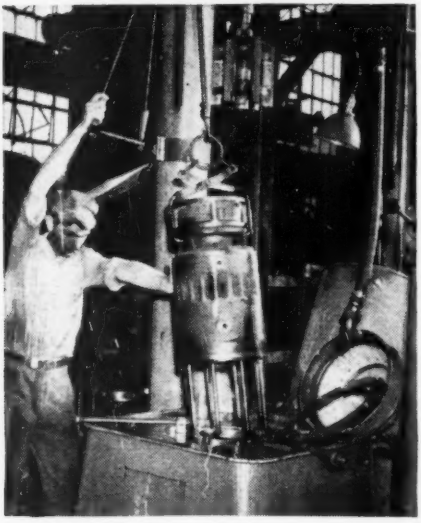
Now! MAKE ONE SOURCE

RESPONSIBLE FOR YOUR HONING RESULTS



FULMER SUPPLIES

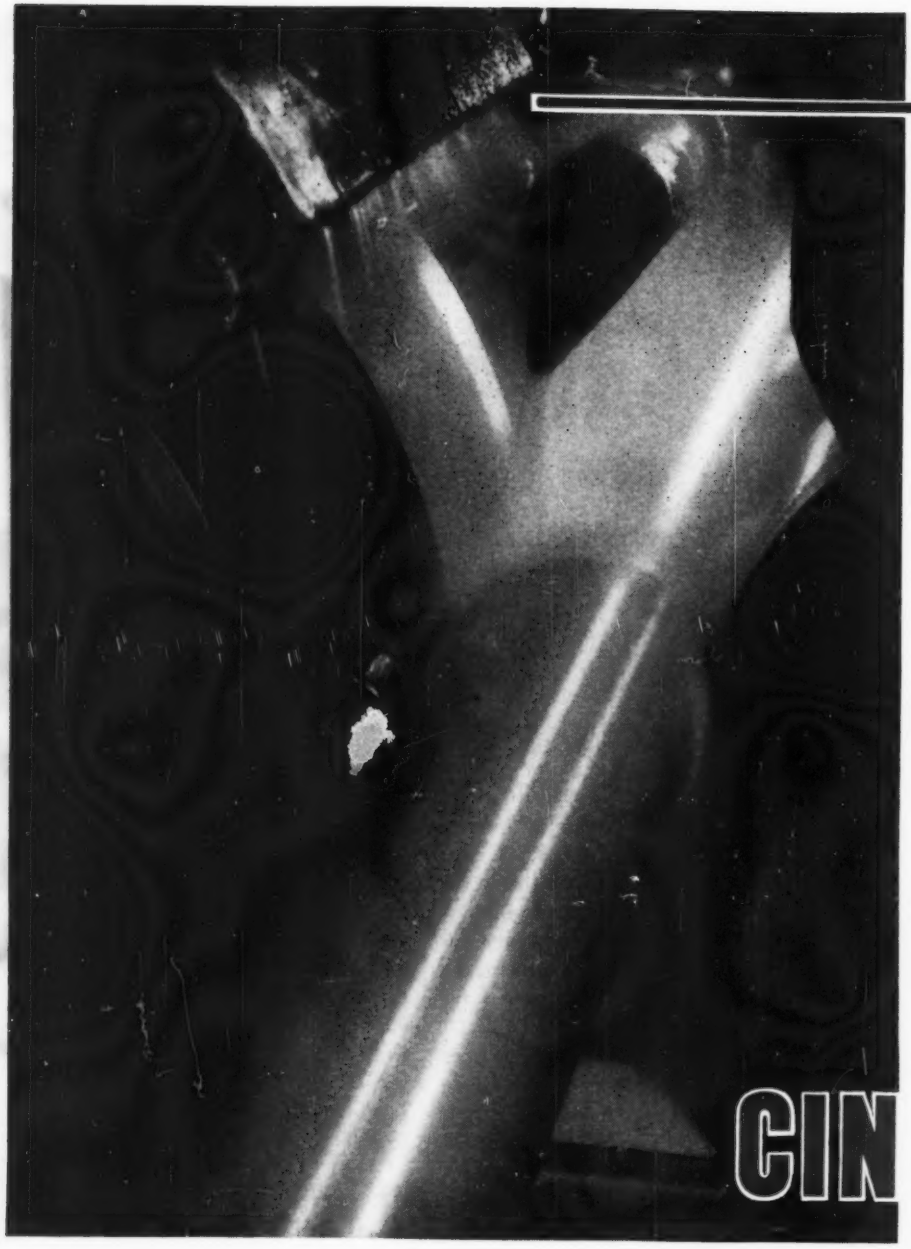
- **HONING MACHINES**
  Fourteen models cover diameters from 1/4" to 30". Strokes to 84".
- **HONING TOOLS**
  Alexander Ball Tools available in sizes to 50".
- **HONING FIXTURES**

Why divide responsibility for the performance of your honing operations among several suppliers? Fulmer supplies a *complete honing package* — honing machine, tools and necessary fixtures—giving the user *one* source that *guarantees* best honing results!

Fulmer Honing Machines are engineered to give maximum production with minimum investment. They are known for rapid stock removal and extreme accuracy. Quick change over for various size jobs. The machines are simple to operate—easy to set up—many users have unskilled labor operating them efficiently.

Save on production time, cut costs and improve quality on finishing all classes of cylindrical bores with a *Fulmer Honing Package*—it offers the *greatest value* in the honing field. Write for Bulletin No. 10 and full details.

C. ALLEN FULMER CO. 1242 FIRST NATIONAL BANK BLDG., CINCINNATI 2, OHIO


CIN

IT WILL PAY YOU TO CHECK THESE *ABC's*

FOR YOUR BAR GRINDING REPLACEMENT PROGRAM

Equipment takes a beating from long bar centerless grinding operations. It's a good idea to check the machine and fixture more often than usual; find out if they are anemic defenders in your replacement formula. When new equipment is economically justified, your best choice is CINCINNATI No. 2 or 3 Centerless, equipped with a CINCINNATI Long Bar Grinding Fixture to suit your requirements. You have a choice of four:

Type A—capacity 1/8" to 1 1/4" diameter, lengths up to 2 1/2 feet. Nos. 2 and 3 machines.

Type B—capacity 1/8" to 1 1/4" diameter, lengths up to 8 feet. Nos. 2 and 3 machines.

Type C—capacity 1/2" to 2" diameter, lengths up to 18 feet. Nos. 2 and 3 machines.

Type D—capacity 1" to 4" diameter, lengths up to 18 feet. No. 3 machine only.

These fixtures are equally advantageous in grinding steel and nonmetallic bars, tubes and rods. More information may be obtained by writing for literature: CINCINNATI FILMATIC No. 2 Centerless, G-591; No. 3 Centerless, G-570-1.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

FILMATIC

CINCINNATI

CINNATI

REPLACE WITH A NEW CINCINNATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

3 H.P. Precision External Grinder with two Internal Spindle units which interchange with external spindle.

for Precision Grinding

Internal

External

Surface!

These HISEY Wide Range Precision Grinders can be mounted on lathes, planers, boring mills, milling machines and other machine tools for all sorts of internal, external and surface grinding operations. Rigid construction throughout insures accuracy for production as well as tool room operations.

Spindle units have dove tail slide and internal and external spindles are quickly interchanged. V-belt drive provides correct speed for all kinds and sizes of grinding wheels.

Bases have large flat pad with bolt slots to facilitate mounting on the regular tool holding fixture of the machine tool. Constant speed motors are used throughout providing uniform wheel speed for best grinding results.

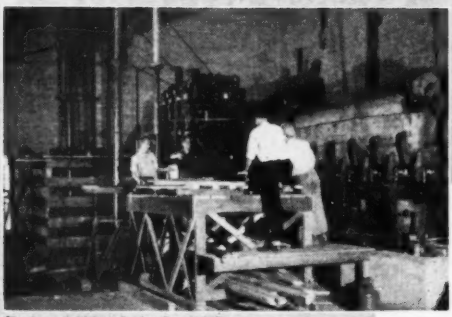
Made in sizes from ¼ H.P. to 10 H.P. capacity

Other "HISEY" Products: Bench and Pedestal Grinders and Buffers, Snagging Grinders, Tool Post Grinders, Wet Tool Grinders, Disc Grinders and Drill Grinders.

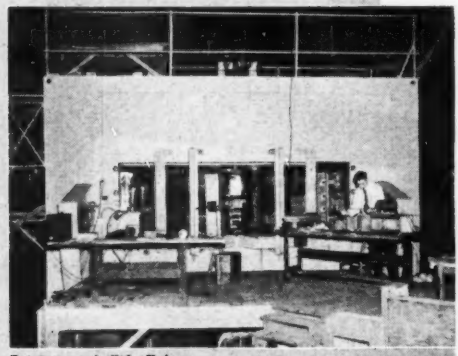
ASK FOR COMPLETE CATALOG 71 BF.

Hisey THE HISEY-WOLF MACHINE CO.
CINCINNATI 8, OHIO
Division of The Cincinnati Electrical Tool Co.

a cincinnati shear helps build the biggest betatron in the world



Cincinnati 10014 Series Special Shear cutting laminations for the Betatron.



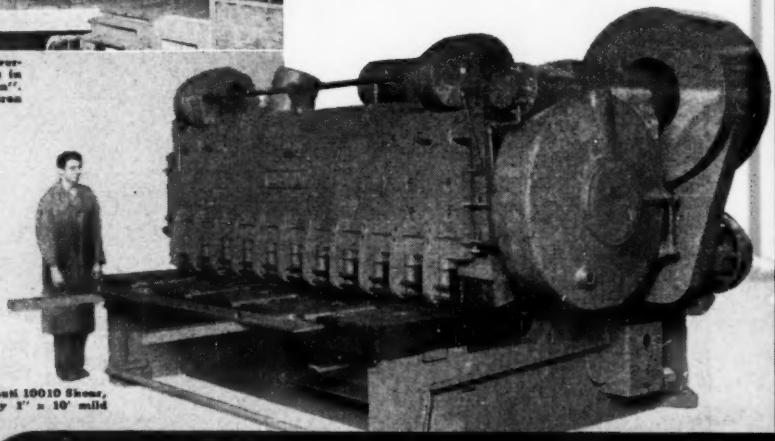
Betatron was built by University of Illinois physicists in combon "Betatron Barn". Flux magnet of Betatron weighs 275 tons.

University of Illinois builds powerful radiation machine to split atoms.

Betatron produces 300 million volts, speeds up electrons to 186,000 miles per second. First job for this Betatron (world's biggest atom smasher) is the study of the mysterious sub-atomic mesons.

A Cincinnati Shear cut the laminations for this spectacular machine. Other Cincinnati Shears also are widely used by electrical manufacturers for shearing lamination stock accurately and without burrs. Knife life is unusually long on a Cincinnati even on this abrasive material.

Write for Catalog S-5 on Cincinnati All-Steel Shears, the shears of accuracy.



Cincinnati 10010 Shear, capacity 1" x 10' mild steel.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

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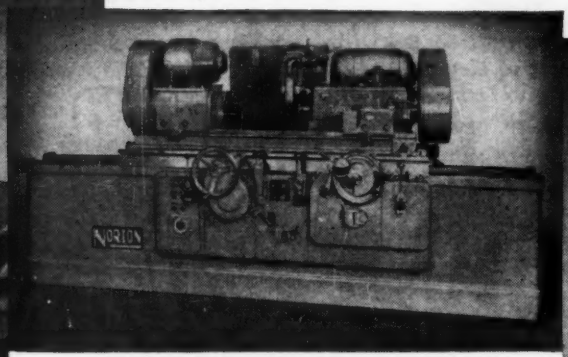
Precision parts for giant tractors economically ground in Norton "CTU's"

IN the huge Caterpillar plant in Peoria, Norton Type CTU Grinders are a "natural" for economically turning out many of the precision parts which are the "heart" of huge tractors and earth-moving equipment.

Like other manufacturers of motive equipment where precision parts are essential, Caterpillar knows that the Norton CTU's produce speedily and accurately—always basic to achieving lowest costs.

Discover for yourself how you can grind more profitably with the CTU. There is a Norton representative or dealer near you who will gladly provide details. No obligation—of course.

M-591A



Norton 10" x 36" Type CTU Semiautomatic Machine

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No. 1488-6" Machine
No. 1787-10" Machine

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How many man hours are lost every day in your plant because metal components are not properly marked?

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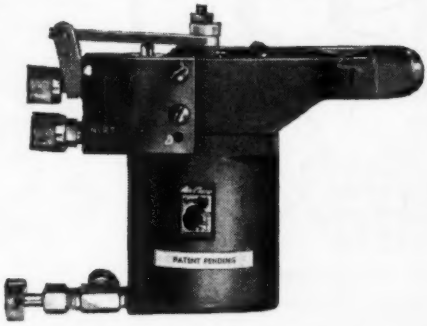

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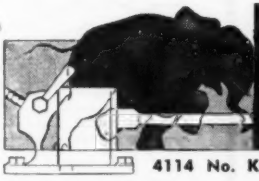
This simple, inexpensive device quickly converts standard drill presses into semi-automatic machines — increases production substantially on suitable jobs: double or more in some cases.

Clamps to spindle quill in a few seconds. Automatically closes air fixture on work. Adjustable feed control and breakthrough cushion. Quick return. Easy to synchronize with automatic cycle equipment.

Air-Power does it quicker, cleaner, better. Write today for latest complete catalog.



MEAD

SPECIALTIES COMPANY

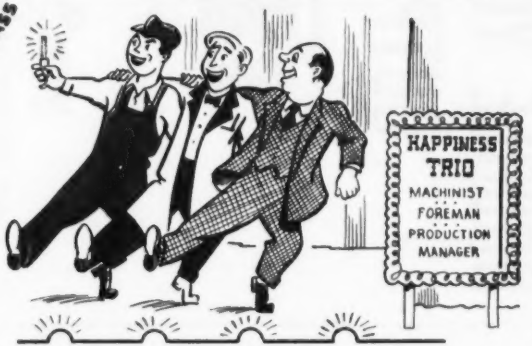
4114 No. Knox Ave., Dept. YA-11, Chicago 41, Ill.

There once was a dancer who "tapped" on the stage.
He bucked and he winged to a ripe old age!

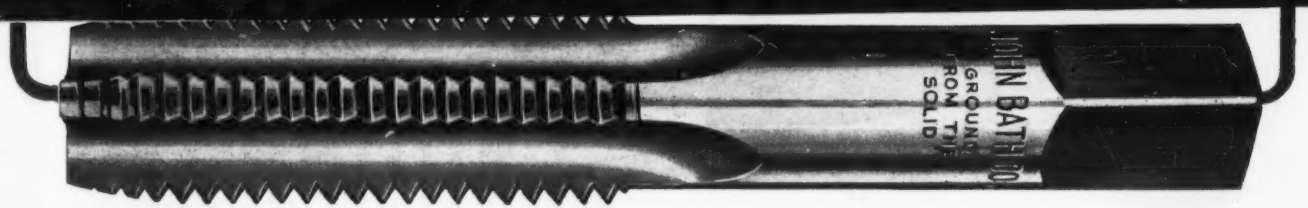
He tapped 'til he "clogged" in bad condition
And they gave him the "hook" at every rendition!

JOHN BATH CO. INC.
B
WORCESTER · MASS

Some folks run taps too deep and too long.
They'll clog and break and cut threads wrong!



Keep Bath Taps in condition, always on hand.
Your production will be "in step" with the band!



INSIST ON BATH TAPS . . . PROFIT BY THEIR PLUS-PERFORMANCE

When Bath Taps leave our plant, expert workmanship and rigid inspection combine to assure plus-performance in your shop. A special Bath process completely hardens the taps to uniform structure before threading, assuring the accurate performance of a precision tool.

Preserving this efficiency is sometimes sacrificed by the operator who (1) runs the tap until it breaks (2) runs the tap until the cutting edge is too worn for proper reconditioning or (3) does not sharpen the tap properly.

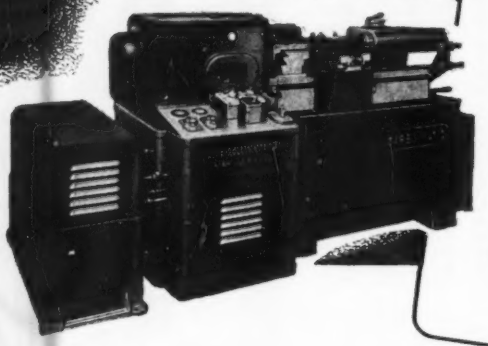
Making a thorough check before every job of the tap style required by the material, of the fixtures and lubrication, will do much to guard against tap and work spoilage . . . will lower the cost per tapped hole. We invite your inquiry on any tap problem . . . ask the Bath representative or write us direct.

PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

JOHN BATH CO. INCORPORATED

14 Grafton St., Worcester, Mass.

these PLUS VALUES mean more output per man hour



1. Super-power for heavier cuts
2. Super-speed for faster cuts
3. Super-smoothness for finer cuts
4. Super-rigidity for truer cuts
5. Completely automatic cycles for easier cuts

LIPE *Carbo-Matic* LATHE

You *can* get greater output per man hour and week, and the Lipe Carbo-Matic Lathe will help you get it.

Super-powered for heavier cuts, it has a wide selection of speeds in the range best suited to carbide tools. Deflection and weaving are eliminated by a bed and headstock cast in one piece, and by a massive tailstock adequate to hold high-speed centers without vibration. Heavy bed sidewalls are reinforced by cross ribs spaced for maximum strength and high resistance to torsional stresses and strains. Chatter, tool wear and breakage are sharply reduced by the smooth-flowing power of a fully-enveloped cone-and-worm gear drive.

Completely automatic with a smooth flexibility of control that affords a larger number of set-up combinations for a greater variety of work, the Lipe Carbo-Matic holds operator motions to a minimum. There is a positive stop for all feeds, a time delay for "dwell", and a micrometer adjustment for depth of cut on all tool carriages. All contributing to more output per man and machine hour.

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LIPE ROLLWAY

Lipe - ROLLWAY CORPORATION

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. . . faster, easier driving with firm finger grip on the knurled heads—spin in with hexagon wrench.

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PRECISION DOWEL PINS

. . . specially hardened (58-60 Rockwell C) to resist upsetting—easier to drive with tapered leading ends to "pilot" the pin into the hole.

PLIES • DANLY TOOL, DIE AND GAGE MAKERS' SUPPLIES • DANLY TOOL, DIE

DANLY TOOL, DIE AND GAGE MAKERS' SUPPLIES

assure tool and die makers of standard part quality fully consistent with good tool making practice. The Danly line includes many items in addition to those shown here such as set screws, bushings, toggle clamps and laps. A nation wide system of completely stocked Danly branches* assures quick, convenient delivery.

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Chicago 50, Illinois

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. . . two complete size ranges, for medium pressure and high deflection or high pressure and medium deflection—precision coiled and ground square for full end bearing.

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DIAPHRAGM ARBOR

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S.E.C.O. BOOSTS PRODUCTION 22%

Sunoco Emulsifying Cutting Oil Ends Rusting, Decreases Downtime, Results in Big Savings

When an emulsifying cutting oil is unable to prevent excessive rusting on machined surfaces, that's bad. But if, in addition, it has an offensive odor, that's worse . . . especially if you have to change it twice a week and thoroughly clean the machines. Three years ago a large manufacturer of electrical products sought a solution to just such a problem. It occurred in his machining of cast iron end-bearing cages for induction motors.

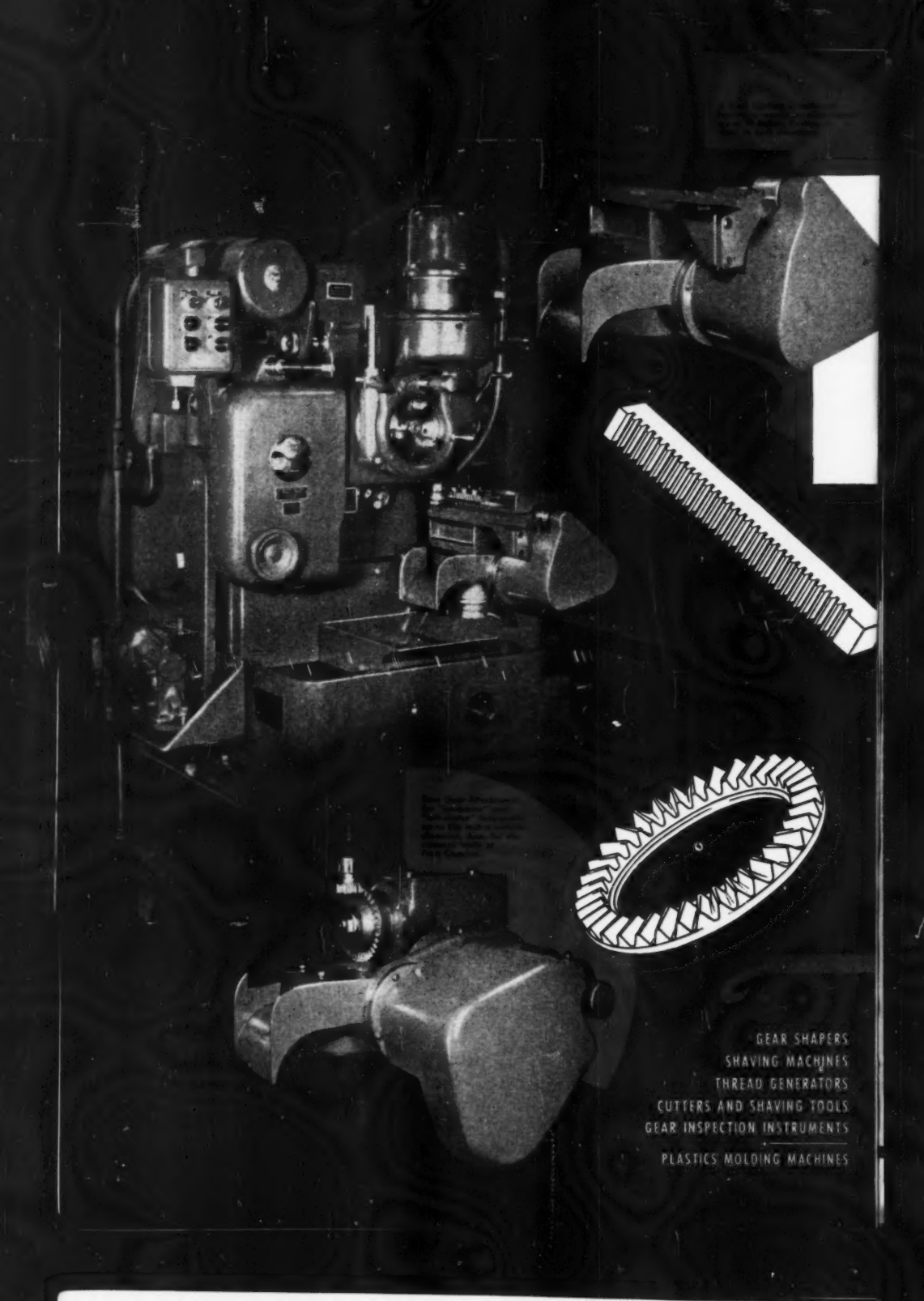
His search ended when a Sun representative introduced him to Sunoco Emulsifying Cutting Oil. Not only has S.E.C.O. prevented the rusting condition, but also cutting fluid changes are now spaced six weeks apart. Translated into management language, the performance of S.E.C.O. has boosted production, curtailed costs, effected savings. By sharply decreasing downtime, it has increased output 22 percent. Savings on oil and maintenance costs are amounting to almost $5,000 a year. The manufacturer is so well satisfied with Sunoco Emulsifying Cutting Oil that he uses it now in every machine which requires a soluble oil.

In all machine shop operations, on both ferrous and nonferrous metals, you'll find Sunoco Emulsifying Cutting Oil and Sunicut straight cutting oils of real assistance. They help maintain production schedules, lengthen tool life, and keep operating costs down. For a free Sun cutting oil recommendation card, write Department MT-1

SUN OIL COMPANY • *Philadelphia 3, Pa.*
In Canada: Sun Oil Company, Ltd.
Toronto and Montreal

SUN PETROLEUM PRODUCTS
"JOB PROVED" IN EVERY INDUSTRY

SUNOCO



GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR INSPECTION INSTRUMENTS

PLASTICS MOLDING MACHINES

Things that can always be done best on the

7-TYPE FELLOWS GEAR SHAPERS*

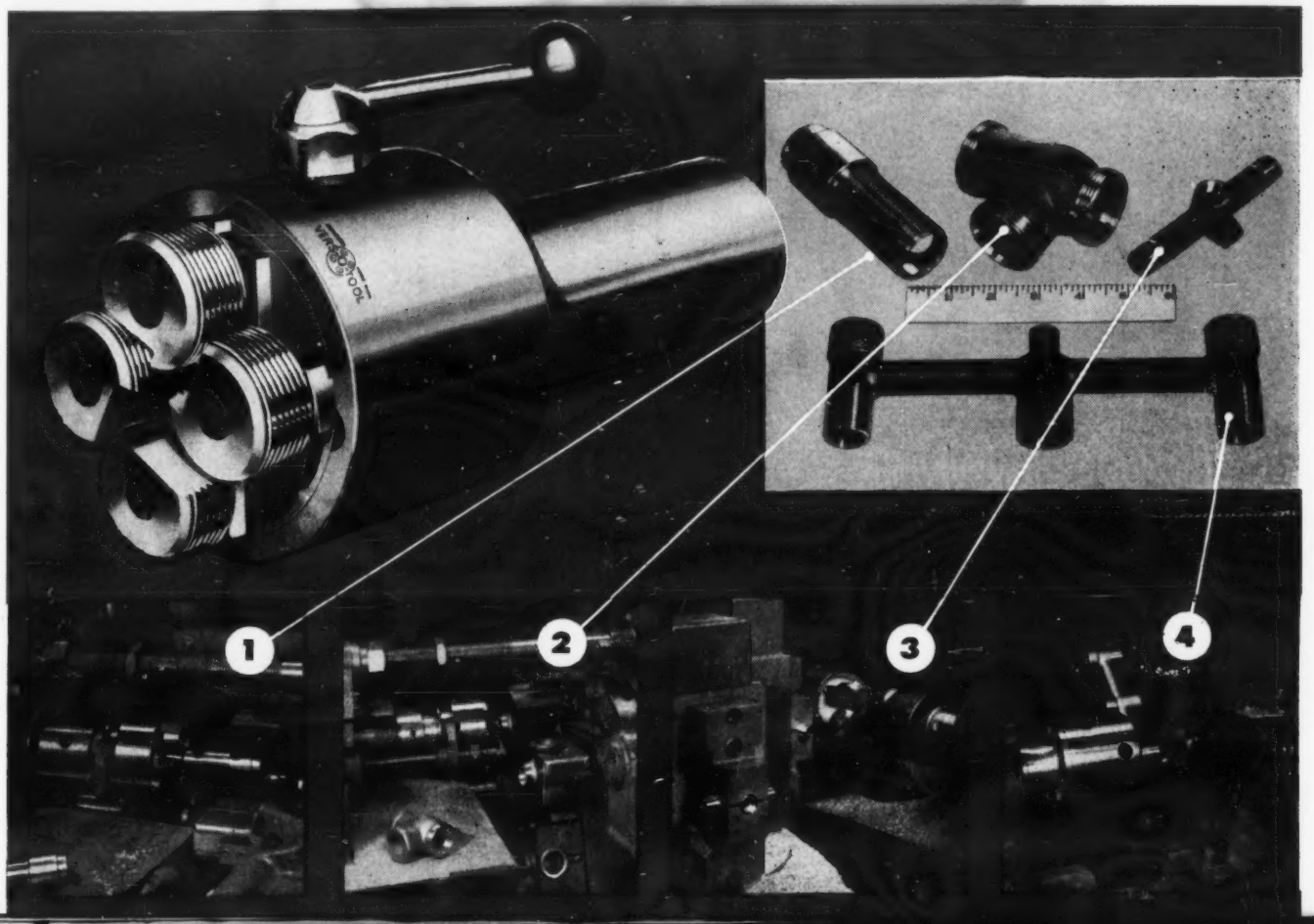
Gears, of course... internal and external, spur or helical, shoulder gears, cluster gears, segment gears, variable radius gears, etc., in all sizes up to the 7-inch capacity of the machines. Cams, ratchets, sprocket teeth, splines, special shapes... for all such and more, these High-Speed Gear Shapers are a first choice wherever large numbers of parts are to be cut.

Illustrated here are two of many Attachments and Devices by which these machines can be most satisfactorily adapted to special work—at a saving in investment over a single-purpose machine. For data on the 7-series Gear Shapers, and an INFORMATIVE NEW BULLETIN on Special Attachments, write or phone the nearest Fellows Office.

*7-Type 1½-in. maximum cutter stroke.
7A-Type 2 in. maximum stroke and heavier duty.

Fellows

THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department • 78 River Street, Springfield, Vermont.
Branch Offices: 616 Fisher Bldg., Detroit 2 • 640 West Town Office Bldg., Chicago 12 • 2206 Empire State Bldg., New York 1.


1
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4

AT REPUBLIC BRASS COMPANY, THEY CHOOSE VERS-O-TOOL

for the tops in dollar performance—in threading production

Faster machining times, lower chaser costs, less tool inventory, greater accuracy—These are just some of the reasons why Vers-O-Tools are the number one choice for fast, economical, precision threading at plants like Republic Brass.

Each of these pluses is directly traceable to the exclusive basic design features of the Namco Vers-O-Tool, including:

CIRCULAR CHASERS—regrindable through a full 270°, for 10 to 50 times longer life.

INTERCHANGEABILITY of chasers, size for size, on all three types of Namco Vers-O-Tool heads keeps tool inventory at an economical minimum.

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• • •

For complete details on Vers-O-Tool's time-saving, money-saving features, ask for Catalog D-49.

JOB FACTS

1. 1 7/16"-18 straight thread—200 per hour—class 2 fit with 1 5/8" D.S. Circular Chaser Vers-O-Tool.
2. 1½"—11½ pipe thread—450 per hour—class 2 fit with 1 5/8" D.S. Circular Chaser Vers-O-Tool.
3. ⅜" pipe thread—250 per hour both ends—class 2 fit with 1" D.S. Circular Chaser Vers-O-Tool.
4. 1"—20—3 seconds each end—class 2 fit with 1" D.S. Circular Chaser Vers-O-Tool.

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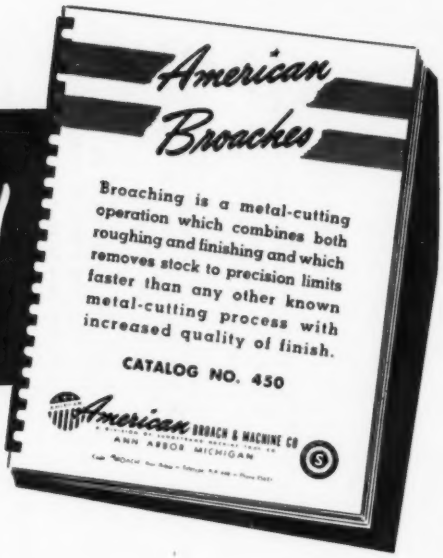
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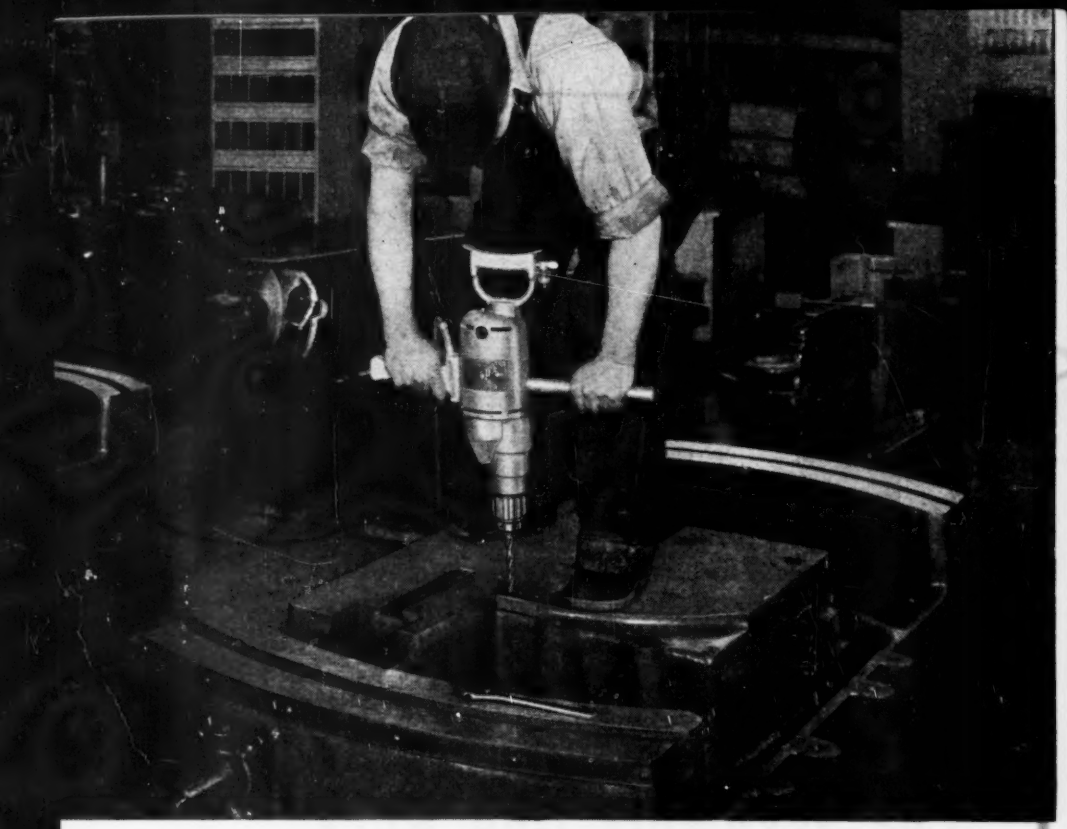
See *American* First—for the Best in Broaching Tools, Broaching Machines, Special Machinery



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The right drill for every job saves you trouble—and money!

¾ inch heavy duty drill ideal for heavy machinery installation and construction. Drives ⅝ inch reamers, 2 inch wood augers. Available with reversing switch for easiest withdrawal from work.

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LONG LIFE—SKIL Drill features . . . precision-cut helical gears, die-cast aluminum alloy housings, balanced motors and finest ball bearings . . . assure years of trouble-free service.

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For layout, inspection or assembly line work

Available either precision ground or planer finished, Challenge Layout Surface Plates offer a perfectly smooth, square surface for layout, inspection or assembly line operations. Sizes range from 12"x18" to 54"x144". All are built of special analysis semi-steel.

The all-steel stand is arc-welded to furnish the rigidity of a one-piece unit. Special leveling screws enable the user to level the plate quickly and to lock it securely.

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For specifications, plus information on other Challenge equipment for the tool and machine industries, write today. 820

THE CHALLENGE MACHINERY CO.

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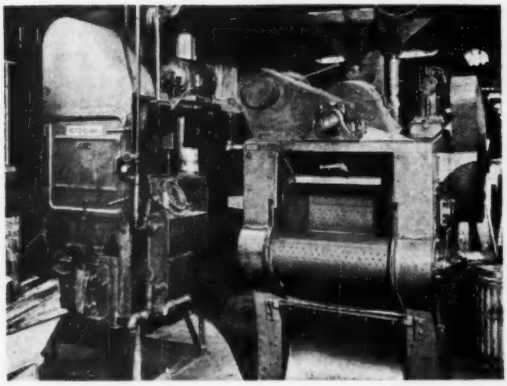
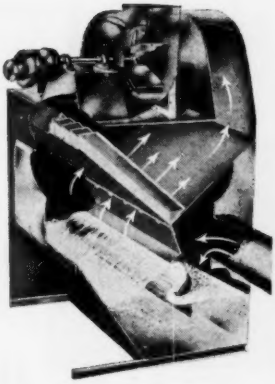




Here's the source and solution of a dust problem side by side

THIS illustration gives proof to the statement, "There's always room for a Roto-Clone". At right, you see an abrasive cleaner which is a high volume dust producer. At left, you see a Type N Roto-Clone* which serves this unit. And the one thing you don't see is dust.

Like all Roto-Clones, compact, space-saving design is a feature of the Type N unit. And it's death on dust! This Hydro-Static Precipitator delivers high efficiency dust separation and collection by a combination of centrifugal force and thorough scrubbing of the air by a water curtain. Exhausting a constant air volume assures effective dust control at all times. There are no secondary dust problems as the Type N discharges the collected material as a sludge for easy disposal.

Don't penalize the efficiency of your operation through lack of proper dust control. It's simple and sure the Roto-Clone way. There's a type and size for every job that can be fitted into your present setup quickly and easily. For complete information, call your local AAF representative or write direct to

AMERICAN AIR FILTER COMPANY, INC.

312 Central Avenue, Louisville 8, Ky.

In Canada: Darling Bros., Ltd., Montreal, P. Q.

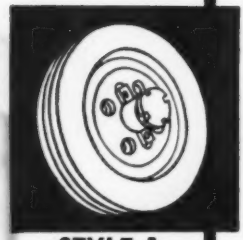
**Roto-Clone is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

®AAF

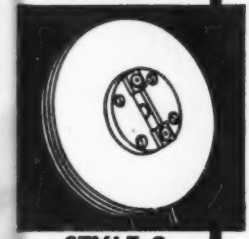
ROTO-CLONE®

DUST CONTROL EQUIPMENT

LOVEJOY Flywheels



STYLE 1



STYLE 2

STYLE 3

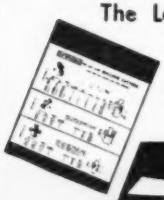
IMPROVE *milling cutter performance*

INCREASE *cutting blade life!*

YOU can increase milling production, improve accuracy and lengthen blade life by using Lovejoy Flywheels. Steel cutting is as smooth as silk, and other metals are usually cut easier and faster with the help of these patented Flywheels. One manufacturer reports a 10-time increase in blade life. Others report complete elimination of chatter with resulting improvement of surface finish. Still others have proof of reduced H.P. requirements.

Lovejoy Flywheels are available for mounting on the spindle of any machine . . . Style 1 for driving shell end mills; Style 2 for bolt-on mills; Style 3 for bolt-on or National Standard arbors.

The Lovejoy Flywheel Bulletin gives full details, specifications and prices.



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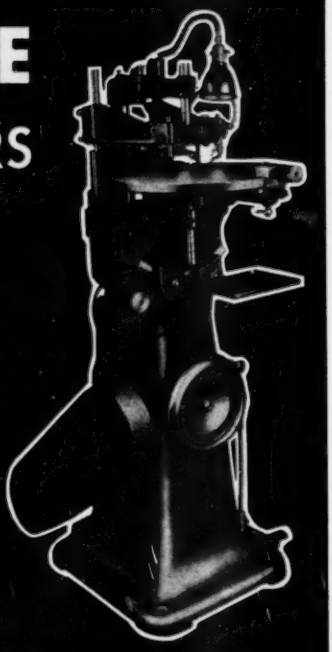

OLIVER
DIE MAKING MACHINES

The long life, precision construction and high performance of Oliver Die Making Machines appeal to the discerning tool engineer. The old hand method of die making retarded the end results of production. That is why Oliver Die Making Machines are in operation in the toolrooms of many of the largest industries in the world.

Oliver Die Making Machines are extremely fast and accurate on all sawing, filing and lapping operations. They will save thousands of man-hours for you.

Five different models are available in two sizes.

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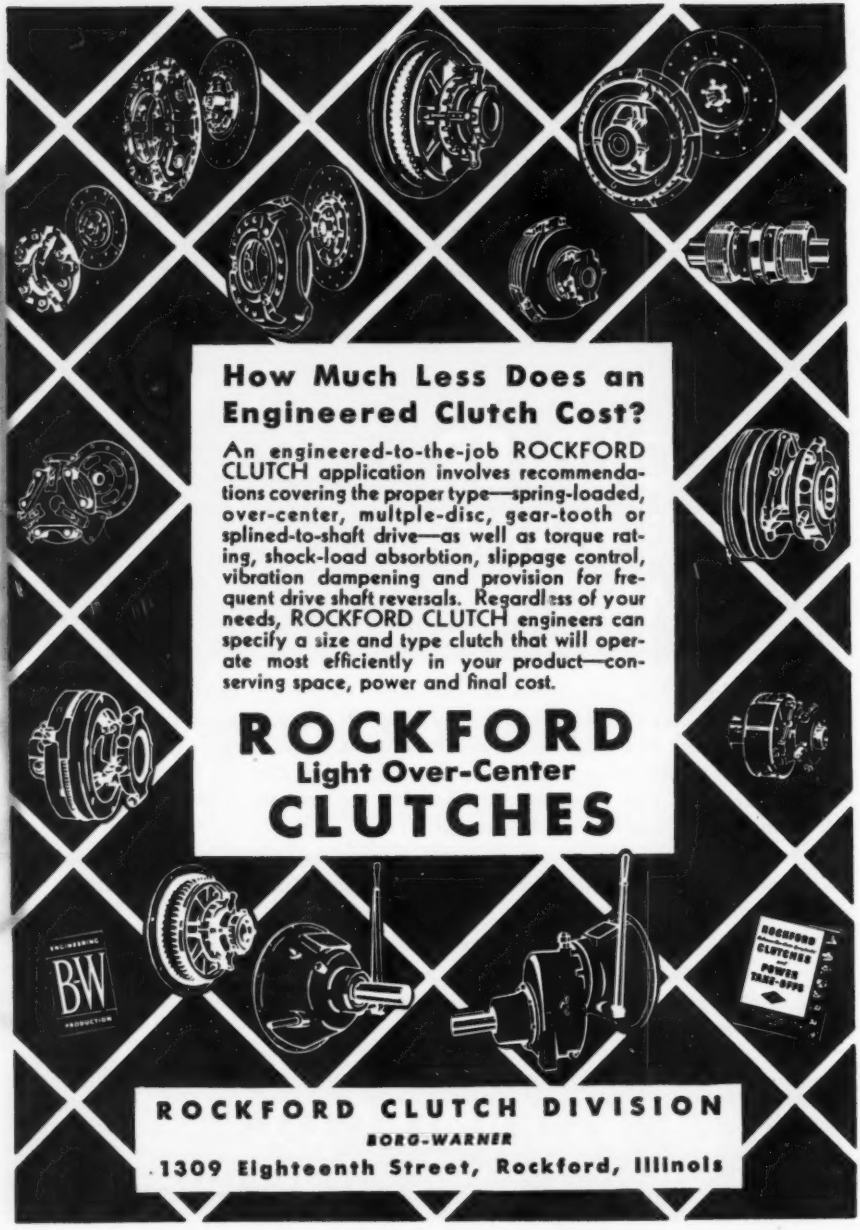
How Much Less Does an Engineered Clutch Cost?
An engineered-to-the-job ROCKFORD CLUTCH application involves recommendations covering the proper type—spring-loaded, over-center, multple-disc, gear-tooth or splined-to-shaft drive—as well as torque rating, shock-load absorbtion, slippage control, vibration dampening and provision for frequent drive shaft reversals. Regardless of your needs, ROCKFORD CLUTCH engineers can specify a size and type clutch that will operate most efficiently in your product—conserving space, power and final cost.
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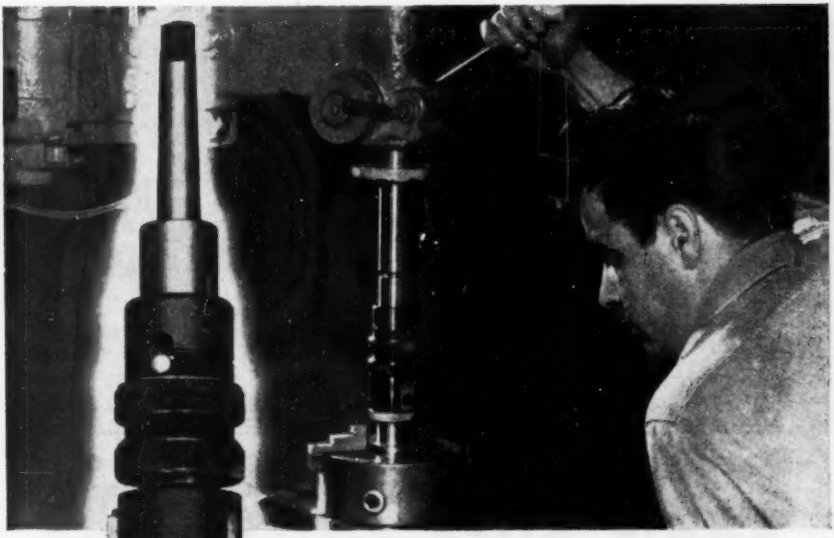


One RECESSING TOOL... *Any* RECESSING JOB!

● Cut Recessing Costs on your Drill Press . . . Boring Mill . . . Turret Lathe . . . Radial Drill . . . etc. **ALL NEW** Series "R" Maxwell Recessing Tools give unlimited versatility.

SIX sizes are stocked for immediate shipment. Shanks to fit your machines are instantly interchangeable. Capable of taking cuts at extremely high rates of feed, the new Maxwell tools feature a micro-adjusting collar which facilitates rapid and accurate diameter control to within 0.001-inch or 0.050-inch per tool revolution. Cutters can be supplied to make single or multiple recessing in a single operation.

Cut location made from either top or bottom surfaces. Ball-bearing pilot facilitates use of Series "R" Recessing Tools with existing fixtures. Without fixtures, ball-bearing pilots will stop on workpiece surface to accurately locate cutter.

Hardened tool-steel wearing surfaces guarantee maximum tool life. Cutting action is smooth and requires only finger-tip feed pressure. Series "R" Recessing tools are regularly furnished having cutter ratio of either 1:3 or 1:1. Hole in tool block permits flow of coolant or lubricant to cutter.

Standard Series "R" Recessing Tools are available to cut recesses from ¼ to 4¼ inches in diameter. Write today for catalog "R" ....

Precision boring with MASTUR heads is described in catalog PBH. These inexpensive tools feature large capacity, adjustability and accuracy. Specifications are charted.

Production Boring with the E-Z set line of Boring heads is subject of catalog No. 30. Complete line of tools is shown. Prices, capacities and specifications are charted for reference.

THE MAXWELL COMPANY

386 BROADWAY **BEDFORD, OHIO**

It's a Fooler

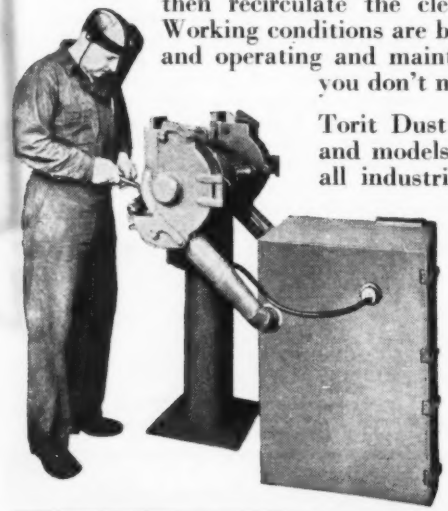
If you play bridge you've probably met some version of the Tennessee Heart hand. Good as the South hand looks, it can't even make a one heart bid. Try it and see.

There's no fooling when

TORIT DUST COLLECTORS

go after dust in your plant

You score a grand slam when you equip cutoff, grinding and polishing machines with Torit Dust Collectors. Easily installed, without upsetting production layouts, they capture dusts, filter and then recirculate the cleaned air back into the room. Working conditions are bettered, there are no heat losses, and operating and maintenance costs are very low . . . you don't miss a trick.



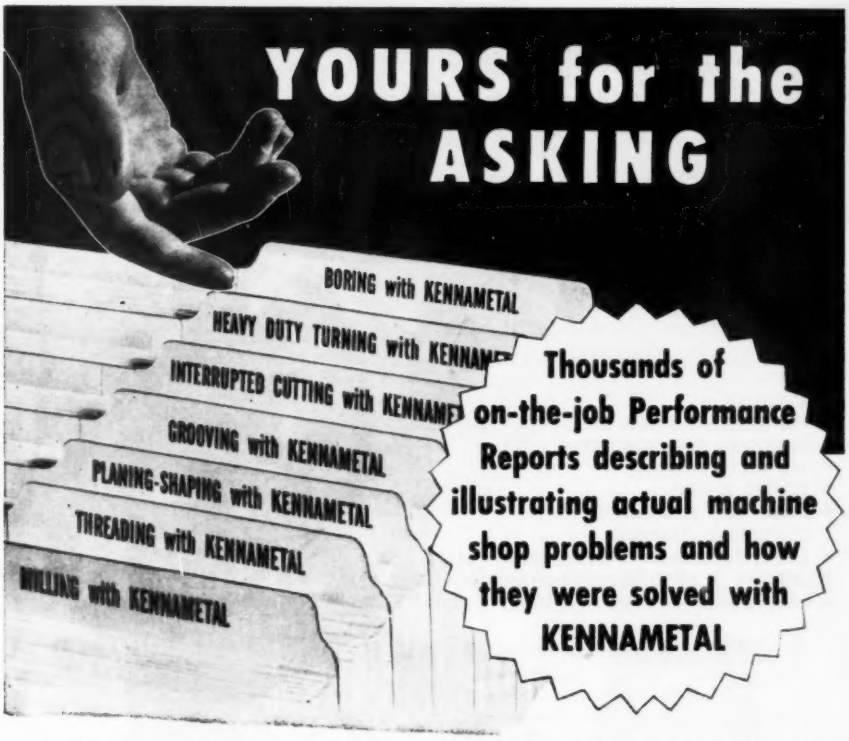
Torit Dust Collectors come in many sizes and models. They are adaptable to nearly all industrial operations. So, if you have a dust problem, put in your bid to:

TORIT

Manufacturing Co.

303 Walnut St. • St. Paul 2, Minn.

P. S. Also ask for the new Torit catalog


YOURS for the ASKING
BORING with KENNAMETAL
HEAVY DUTY TURNING with KENNAM
INTERRUPTED CUTTING with KENNAME
GROOVING with KENNAMETAL
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Thousands of on-the-job Performance Reports describing and illustrating actual machine shop problems and how they were solved with KENNAMETAL

• Suppose you could ask thousands of practical machine shop men—*"What was the best production idea you had this year?"* Wouldn't their answers save you headaches, time, and money?

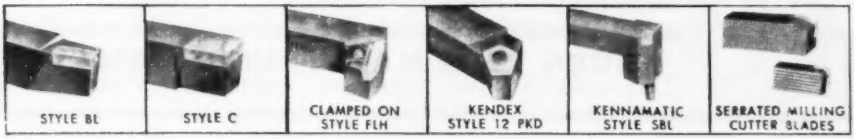
Kennametal Inc. has the answers—more *practical* information on jobs of diversified types on all kinds of materials than has ever before been accumulated and offered.

Jobs are classified so that we can send you data sheets on that type of work that interests you. Just ask for Performance Reports and mention the general type of job and material.

Do we have reports on the "tough" jobs you have solved with Kennametal tooling? Our representative who calls on you will appreciate the details.

KENNAMETAL *Inc.*, Latrobe, Pa.

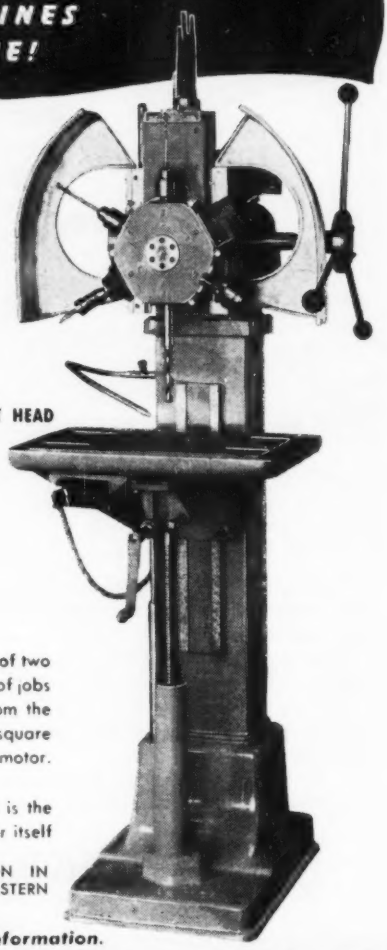
MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTIVITY



THE *Burgmaster*

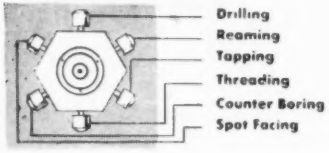
SIX SPINDLE
TURRET TYPE AUTOMATIC INDEXING
DRILLING and TAPPING MACHINE

GIVES YOU 6 MACHINES IN ONE!



Burgmaster A Universal Type Production Machine, features .....

- 8" STROKE
- PRE-SELECTIVE SPINDLE SPEEDS (choice of 6 per set up)
- INDIVIDUAL PRECISION DEPTH STOPS
- 110 VOLT CONTROLS
- 2-SPEED MOTOR
- ADJUSTABLE FEED HANDLE
- 9¼" THROAT CLEARANCE
- 15" x 21" TABLE WORK SURFACE WITH T SLOTS
- SPINDLES SHIELDED DURING INDEXING OF TURRET HEAD
- ONLY SPINDLE IN OPERATION TURNS



The Burgmaster enables one operator to do the work of two or three and get the job done faster, better. A variety of jobs can be handled without moving the work piece from the machine table. It is simple to set up, requires but 6 square feet of floor space and is powered by a single motor.

Burgmaster users will tell you that their Burgmaster is the most economical machine in their shop, and pays for itself in a short period.

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Write today for detailed information.

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S. S. WHITE FLEXIBLE SHAFTS

make them easier to handle!

Why? Because they relieve the operator of the need for handling the weight of the motor. With the motor suspended, slung from the shoulder or mounted on a stand or bench, as shown above, the operator can move the tool freely and expertly. As a result he can do better work and more of it.

WRITE FOR NEW BULLETIN 5008

It contains the latest information and data on flexible shafts and their application. Write for a copy today.

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TUKON for Micro-Indentation Hardness Testing

Wilson now offers 3 models for use with either Knoop or 136° Diamond Pyramid Indenter.

Model MO—Mechanically operated—simple, economical. Bench or floor type. Applies loads from 1 to 1000 grams.

Model FB—Fully automatic—most popular model. Applies loads from 10 to 3600 grams.

Model LR—"Long Range" model—the ultimate in hardness testing. Applies loads from 10 to 50,000 grams.

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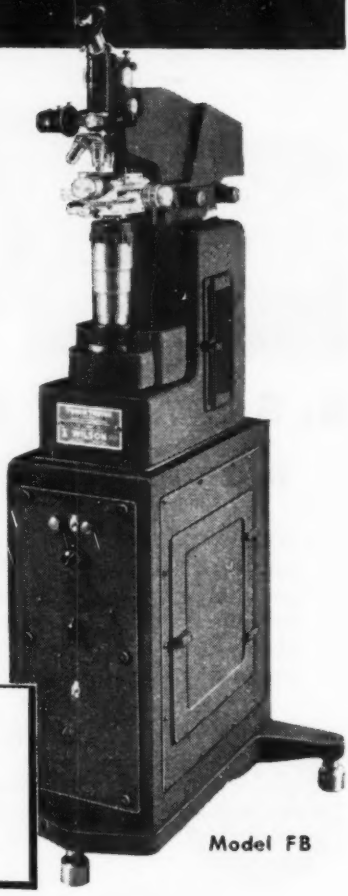
Made by WILSON, manufacturer of "ROCKWELL" Hardness Testers and "ROCKWELL" Superficial Hardness Testers.



Model FB

WILSON
MECHANICAL INSTRUMENT CO., INC.
AN ASSOCIATE COMPANY OF AMERICAN CHAIN & CABLE COMPANY, INC.

ACCO

230-T PARK AVENUE, NEW YORK 17, N. Y.

Pump Rotors Checked to within .0005" on SUNDSTRAND BENCH CENTER

Simplify assembly, lower spoilage and get better production from this modern Sundstrand Bench Center. For instance, this manufacturer of pumps checks the concentricity of the O.D. of the pump rotors within .0005" with the spline and checks side runout with the spline to within .0005". You'll check work between centers easier, faster and within limits of .0001" on this improved Sundstrand Bench Center.

"One-hand control" over all movable elements leaves the operator's second hand free to control rotation of the part being checked. Either headstock or tailstock can be unclamped, positioned and locked in place with a single hand operating the top lever. Investigate this bench center today.

AVAILABLE IN THE FOLLOWING SIZES

6" x 18"	12" x 36"	12" x 60"
6" x 36"	12" x 48"	12" x 72"

FREE DATA

Get complete specifications and additional features from this circular. Write for your copy today. Ask for Bulletin No. 403.

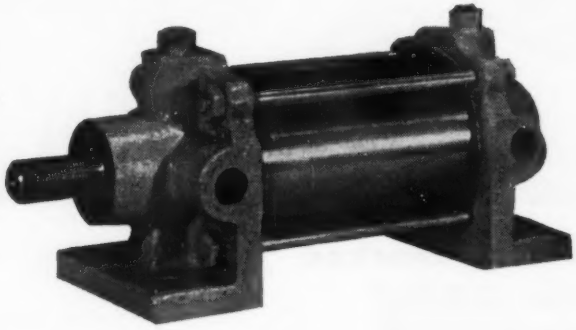
SUNDSTRAND
MACHINE TOOL COMPANY
2535 Eleventh St. • Rockford, Ill., U. S. A.

Jackson Air Cylinders

Series "B"

Non-Rotating – Cushioned – Non-Cushioned

A new Air Cylinder for use in your plant and as standard equipment on your product.



Precision manufacturing methods guarantee long life and maximum power without leakage.

Heavy brass cylinder walls and oversize chrome plated piston rods assure rigidity and long life. Large inventories at our factory mean quick delivery and time saved for you. Send for the Jackson Air Cylinder catalogue and price list and see for yourself how you can save time and money.

Some sales territories are still open and we invite inquiries from established concerns.

Lynair Incorporated

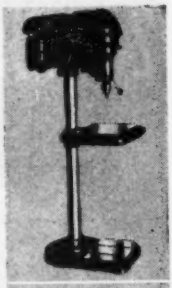
505 W. Washington St. Jackson, Michigan

THE ONLY HEAVY DUTY 15-INCH DRILL PRESSES

with 5/8-inch Drilling Capacity

BOICE-CRANE

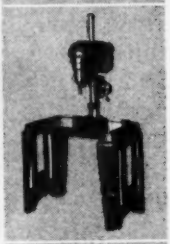
SERIES 2600



*Heavy box-type helmet head. *50% thicker column. *Guaranteed closer tolerances wherever it counts. Much more accurate than ordinary 15-inch drills "built to sell at a price." *20% larger quill, actually 2 1/2" dia. *Up to 50% more bearing against side thrust on quill when deep hole drilling and routing. *Rugged steel (not die cast) 6-tooth splined drive sleeve. *Far more sensitive, powerful quill feed. *Quick acting hinged belt guard.

Boice-Crane doesn't try to build the cheapest—but rather the finest intermediate capacity tools at a price only slightly more than that of less accurate, limited capacity, flimsily-built machines.

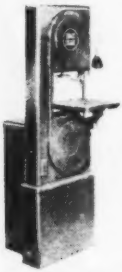
50 HIGH & SLOW SPEED BENCH & FLOOR MODELS
1-2-3-4 SPINDLES



*5 speeds—25% greater range. Easy speed changing. *Various options on work tables. *Heads and parts sold separately for special setups. *Full line of accessories, tapping heads and foot feeds.

Boice-Crane also offers a 15-inch light duty drill press line in 12 models at a popular price.

★ ★ ★



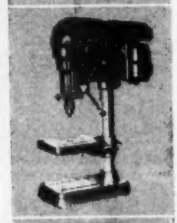
UP PRODUCTION AS MUCH AS 1000%

with the first low-priced, medium size

Combination Contour Saw & Band Filer

Cuts • Files • Grinds

Produces maintenance parts, short run production parts, metal templates, special wrenches, wrench templates, cams, spiral parts, irregular shaped stacked parts, and stamping, forming and trimming dies in minutes instead of the hours required by old methods involving milling, shaping and hand filing. Does precision filing, file broaching and flash removal in one-ninth the time required by hand and one-fourth the time required by reciprocating filing machine.



*Solid welded steel frame. *15" x 15" ribbed cast work table. *Improved guide design sharply reduces blade costs. *Handles blades 3/16" to 3/4" *File bands come in 1/4" and 3/8" widths, two shapes, six cuts. *8 speeds, from 92 to 4100 blade f.p.m. Chart, mounted on machine, shows correct speed for accurate inside, outside and contour sawing of all industrial materials.

PROMPT DELIVERY THROUGH INDUSTRIAL SUPPLY DISTRIBUTORS

BOICE-CRANE COMPANY

936 Central Avenue • Toledo 6, Ohio

Please send ( ) Boice-Crane Drill Press Catalog. ( ) Boice-Crane Band Filer Brochure. ( ) Boice-Crane Woodworking Power Tool Catalog.

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SOUTH BEND 2-H TURRET LATHE

Keeps Costs Down on Precision Parts

This precision-built turret lathe is designed specifically for the machining of accurate, duplicate parts. It is especially suited for large-volume, second operations that require close tolerances and smooth finishes.

The choice of 48 power cross feeds, power longitudinal feeds and thread cutting feeds and the 96 power turret feeds provide combinations for maximum cutting efficiency. Find out now how this precision turret lathe can help keep down your costs.

MODEL 2-H TURRET LATHE

with 6' bed (28¼" max., spindle nose to turret face); 1⅛ collet capacity; 2-speed, 3 ph., 440 V. A. C. motor, controls.

f. o. b. factory $3021.75

Handlever collet attachment, coolant pump and splash pan extra.

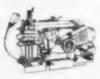
Time Payments available

SOUTH BEND LATHE

SOUTH BEND 22, IND. • *Building Better Tools Since 1906*

Send Information on:

☐ LATHE ATTACHMENTS



☐ 2-H TURRET LATHE ☐ TIME PAYMENT PLAN ☐ 9" and 10" BENCH LATHES ☐ 10" to 16-24" FLOOR LATHES ☐ 14" DRILL PRESSES ☐ 7" BENCH SHAPERS

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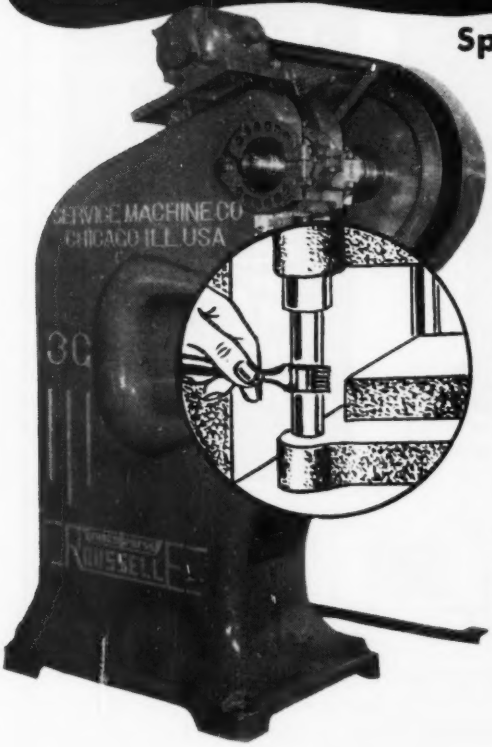
Insist on

COMPLETE PROTECTION

for Pins and Bushings!



Specify **CMD**

Anti-Scoring

LUBRICANTS

These Concentrated lubricants have no equal for use on guide posts and bushings of die sets because they give *Complete* protection for a long period of time. Check their many outstanding advantages.

1. They outlast ordinary lubricants three to one.
2. They prevent any metal to metal contact.
3. They increase die life.
4. No scoring or seizure.
5. Will not drip off.
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Write for FREE sample kit of one tube each of CMD Center Point Lube and CMD Center Point Oil. Address Department 1B.

Chicago Manufacturing & Distributing Co.
1928 West 46th Street Chicago 9, Illinois

10" or 14"

TWIN WHEEL TOOL GRINDER

WET OR DRY

For Carbide, Stellite, or High Speed Steel Tools.

one step from rough to finish grind

Heavy Duty
Wet or Dry
10" - 14" Wheels

Type TD

10TD 10" - 14TD 14"

Twin Wheel Tool Grinder

(Also SINGLE CUP WHEEL)

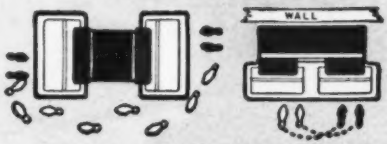
Also:

GRINDERS — ALL KINDS! UP TO 100 H.P.

BUFFERS — POLISHERS UP TO 60 H.P.

ABRASIVE BELT MACHINERY

SPECIAL MACHINERY



OLD WAY

Lost time between rough and finish grind.

Floor space wasted — Grinder must be away from wall.

NEW WAY

One step from rough to finish grind.

Conserve floor space — place Grinder against the wall.

Positively no spray or splash when grinding wet!

WRITE FOR BULLETIN 18 TODAY!

THE STANDARD ELECTRICAL TOOL CO.

2486 RIVER ROAD **CINCINNATI 4, OHIO**

You saw this machine in operation at the National Metal Exposition and Congress, Booth 2102, Chicago, Ill.

SAVE TIME—SAVE MONEY WITH famco (COST CUTTING) machines

ARBOR PRESSES

In 32 stock plain lever, simple ratchet, combination compound and simple ratchet models, bench and floor types. Deliver up to 15 tons pressure.

DRILL PRESSES

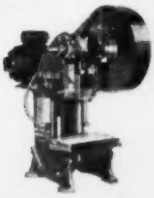
Best buy in 15" drill presses. Complete line of single and multiple spindle models, bench and floor types. Many exclusive Famco features.

FOOT PRESSES

In 10 bench and floor type models of sturdy, semi-steel construction, accurately machined for trouble-free operation. Deliver up to 3¾ tons pressure.

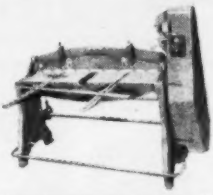
POWER PRESSES

Open-back, inclinable, bench and floor type. Heavy semi-steel, cast iron frame and drop-forged, one-piece crankshafts. Most models; highest quality in small presses.



SQUARING SHEARS

In 3 power and 5 foot models. Cutting widths 22" to 52". Capacity up to 18 gauge mild steel. Inexpensive, ruggedly built, many features.



METAL CUT-OFF BAND SAWS

High quality machine tool made in both dry and wet cutting models. Capacity up to 6" round and 6" x 12" rectangular stock. Many exclusive Famco features.

Designed for time-saving jobs . . . built for long-lasting performance and maintenance economy, Famco machines have earned the reputation of being the finest quality tools for the price. They are a development of nearly a quarter century of design and manufacturing experience . . . incorporate exclusive features not found on any other make regardless of price, and many found only in more expensive lines. The complete Famco Line is available through industrial equipment distributors everywhere.

FAMCO CATALOGS GIVE FULL DETAILS

We invite you to check your needs against the Famco Line, shown above, then write for catalogs on the products in which you are interested. There is no obligation.

FAMCO MACHINE COMPANY

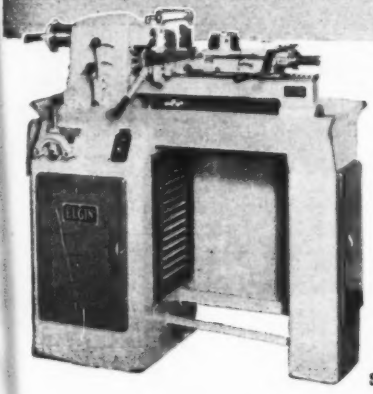
SALES DEPT. 1320 18TH STREET • RACINE, WISCONSIN

ON SMALL DIAMETER PRECISION PARTS

Elgin

WILL MACHINE THEM . . . .

Faster: More Accurately



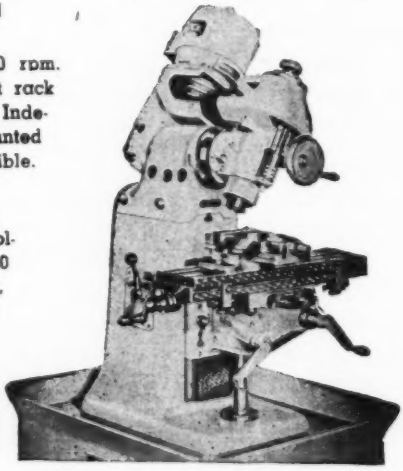
If your production problems depend on the speed with which small parts are machined, an ELGIN may be your answer. The line of ELGIN High Speed Precision Bench Tools is designed to pay you dividends in better machining results, faster production and greater versatility. Write for specifications, prices.

Elgin Knee Hole Type Hand Screw Machine

Variable speed range, 120 to 3800 rpm. 9" swing. 1" collet capacity. Collet rack inside of motor compartment door. Independent coolant system (5 gal.) mounted in rear, outside—cleaner, more accessible.

Elgin Vertical Bench Milling Machine

Preloaded ball bearing spindle. 9/16" collet capacity. Five speeds ranging from 400 to 4000 rpm. Vertical travel of spindle, 1¾". Table 4½"x18". 90° swivel each side of center line.



ELGIN TOOL WORKS
1772 Berteau Ave., Chicago 13, Ill.

Lower cost Jig Grinding

proved by Vulcanaire for over **3** *years*

HOW? You place the Vulcanaire quickly in the spindle of your jig borer or mill.

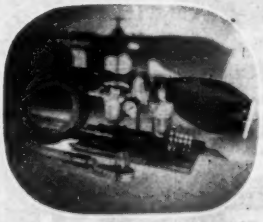
NOW! You can locate—finish grind holes in hardened steel to "tenths" at controlled speeds up to 65,000 R.P.M. . . . grind dowel holes—square with a ground base . . . move location of holes in hardened steel blocks . . . grind interchangeable holes in hardened sections . . . grind .032 to ⅛" holes with diamond impregnated laps . . . grind contours and relief with tungsten carbide burrs . . . grind radii in die sections . . . grind contours in gages . . . jig grind large and awkwardly shaped components . . . eliminate jig bushings in tools where close spacing is essential.

PRECISION! Jig ground requirements are being designed into tools by the most enlightened engineering departments . . . Jig ground the hardened die, stripper plate, and die holder all fit together . . . uniform clearance means longer runs.

ADVANTAGES! The investment is less than for many Jig Boring accessories such as a rotary table . . . the Vulcanaire can be put on and taken from the machine in a few seconds . . . the Vulcanaire is completely portable (all accessories are platform mounted) . . . the system can be used between several machines of various capacities . . . employing both the 10,000 and 20,000 series, components with various sized holes from the very smallest to 4" in diameter can be Jig Ground . . . the average Jig Borer operator becomes proficient at Jig Grinding after very little experience.

TOPS IN PRECISION! . . . the Vulcanaire is precision built throughout and is constructed of alloy and tool steel. Super precision bearings, preloaded with our special fixtures are used, with all traces of radial and end clearances removed, resulting in Vulcanaire Jig Grinding to "tenths".

COMPLETE SYSTEM INCLUDES



DUST ELIMINATION
FOR JIG BORERS OR MILLS

For quotation and literature please mention machine tool application.

Vulcanaire
BUILT BY TOOLMAKERS
FOR TOOLMAKERS

Vulcan Tool Company

Highland & Lorain Ave.
Dayton, Ohio

SAVE MANPOWER
ELIMINATE Tool & Die Breakage
INCREASE PRODUCTION
YOU CAN DO THESE WITH
PROTECTRON

Protectron is your guarantee of unfailing vigilance in guarding against tool and die breakage.

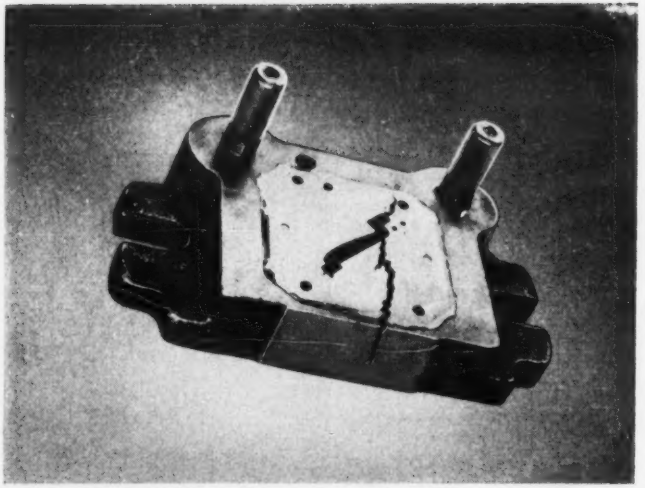
Protectron senses minute increases in mechanical load and automatically "trips" machines *before* damage occurs.

The infallible performance of Protectron enables one man to operate four machines, thus releasing three men for other work — a vital factor in increasing production.

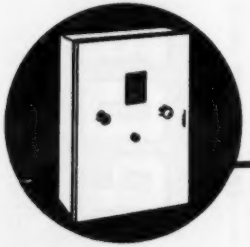
Protectron is adaptable to almost every automatic operation where damage to tools, dies and equipment would mean expensive replacement and loss of valuable production time. Let our field engineer help determine your requirements. No obligation.

"No single device saves you so much, so quickly, at so little cost", say users of:

Automatic Presses, Eyelet Machines, Milling Machines, Automatic Screw Machines, Conveyor Systems, Conveyorized Machinery, Drilling Machines, Mixers and Agitators, Broaching Machines, Packaging Machinery, Special Machinery.



It can't happen with Protectron

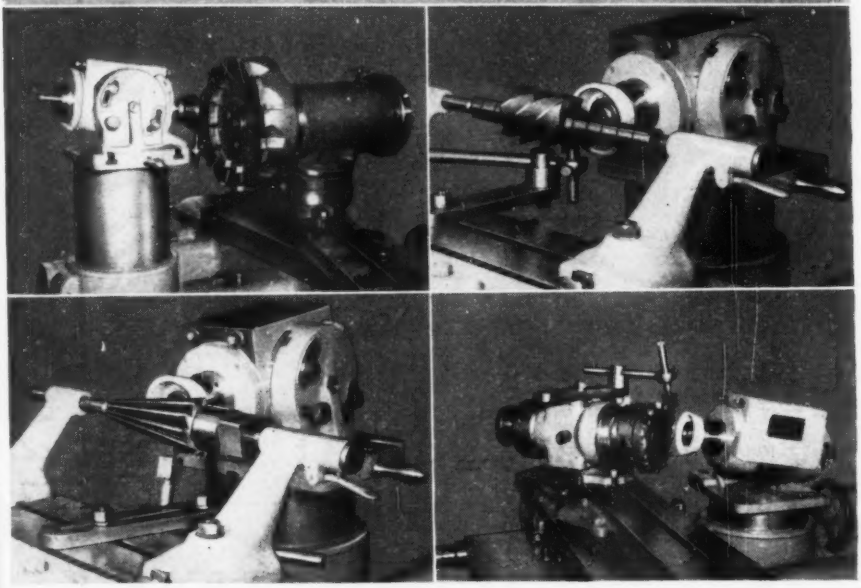


The Brinnell Company

GRANBY, CONN.

NEW
with new adjustment

This POPE
Motorized
Tool and Cutter Grinder
SPINDLE



Here's one you've always wanted — a totally enclosed, sealed lubrication, super precision 1 HP, 3600 RPM motorized tool and cutter grinding head, mounted on a new bracket that provides *angular adjustment in a vertical plane.*

POPE Spindles have the radial and axial rigidity to make wheels cut faster — spark out quicker. Grinding time is reduced. Softer wheels can be used for cooler grinding and for producing the kind of cutting edge that stands up.

Make the most of your present grinders. Equip them with this new and better POPE Spindle.

Ask us to quote price and delivery.

SPECIFY THIS POPE SPINDLE ON YOUR NEXT TOOL AND CUTTER GRINDER

No. 71

POPE
TRADE MARK REG. U.S. PAT. OFF.

POPE MACHINERY CORPORATION
ESTABLISHED 1920
261 RIVER STREET • HAVERHILL, MASSACHUSETTS
BUILDERS OF PRECISION SPINDLES

KEEP YOUR MACHINES RUNNING...

DON'T STOP SPINDLES TO CHANGE TOOLS

MODERN-MAGIC CHUCK
AND COLLET EQUIPMENT

Increase your production through elimination of spindle stoppage for tool change. With Modern-Magic Chuck and Collet equipment, tools are quickly and easily changed as the spindle revolves at operating speed. Simple, advanced design makes Modern-Magic Chucks and Collets practically trouble-free. Sturdy, fool-proof construction insures longer accurate service. Your copy of Bulletin M-103 giving full information will be sent upon request. Today?

Only the ORIGINAL Modern-Magic Chuck and Collet Equipment carry the name "MODERN-MAGIC" and are manufactured by Modern Tool Works, Rochester, N.Y.

MODERN TOOL WORKS

DIVISION OF

CONSOLIDATED MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

AT YOUR FINGERTIPS

A must for your bench — Horberg Drill Size, Pin Gages. Unlimited time and cost saving advantages in center and location finding, hole or slot gaging.

- Held Accurate to +.0001 −.0000
- Concentric tapered to fit holes .0012 smaller than gage size.
- 1½" in length for easy insertion
- Highest quality oil hardened tool steel
- In convenient indexed stand for quick selection

Letter sets of 52 gages, A-Z in pairs
Fraction sets of 60 gages, 3/64" to 1/2" in steps of 1/64" in pairs
Number sets of 120 gages, 1 to 60 in pairs
Individual gages in stock
Extra stands available

All Items Stocked for Immediate Delivery

FROM **THE *Horberg* GAGE COMPANY**

21 STAPLES ST., BRIDGEPORT, CONN.

Quantity

..... Letter Sets @ $45.
..... Fraction Sets @ $50.
..... Number Sets @ $90.
..... Single gages @ $ 1.
..... Stand alone @ $10.

Please Rush checked items and literature to

Company.....
Address.....
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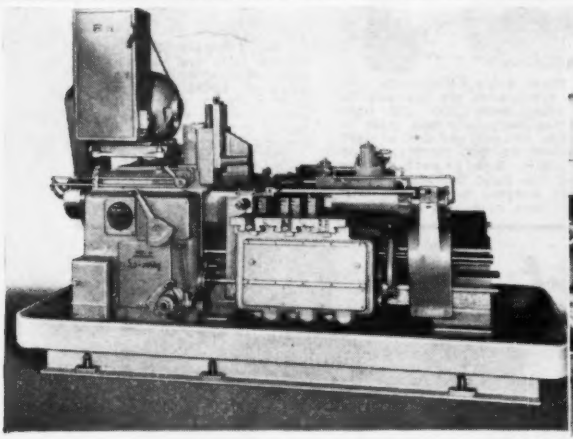
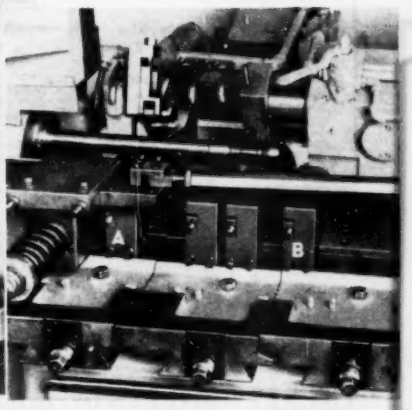
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK





MODEL "AR" Lo-swing SLASHES COSTS ON MAIN DRIVE SHAFT

Problem: To offset high labor costs by increased production on Main Drive Shaft.

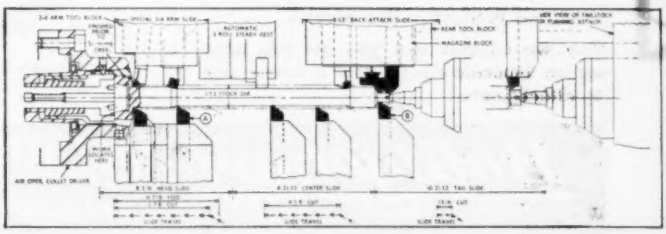
Solution: The Model "AR" Automatic Lo-swing Lathe was selected for this job because it had sufficient weight and rigidity to insure long tool life at high cutting speeds with sintered carbide tools.

Shafts are delivered to the Lathe with the gear end finished to size and the small end centered. The line drawing shows a cross section of the collet chuck which centers and drives the shaft on the gear end. This method of driving increased the rigidity of the shaft. The three-roll steady rest is automatically operated, the rolls being advanced to contact the shaft as soon as tool "A" turns a spotting wide enough to clear the rolls. Tool "A" is the only tool cutting until the steady rest rolls support the piece, after which all the other tools start cutting simultaneously.

Another feature on this machine is the Automatic Tailstock Turning Attachment, shown in the close-up illustration, which is used to rough turn the small end of the shaft ahead of tool "B" which finish turns. This small diameter is held within close limits by this method and a green grind operation is eliminated.

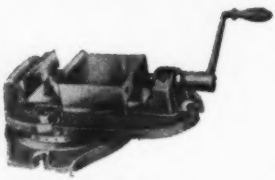
The complete cycle is automatic; the operator simply loads and unloads the parts and pushes the starting button. All tools are carbide. Material is SAE 5140 steel forging and the machine cycle time is 30 seconds.

If you want lower production costs, let us help you with your turning problems.



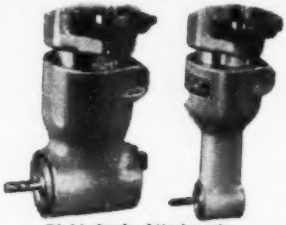
SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing



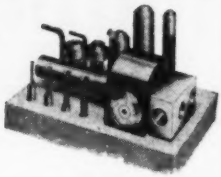
Milling Machine Vise

This improved vise provides greater gripping power. It is stream-lined for appearance and is furnished with a large diameter screw for rigid holding. A coolant trough is also provided. Two sizes are available: 5"x3½" and 6"x5" jaw openings.



Right Angle Attachments

These attachments are available in two types, heavy duty and light duty. The heavy duty type, made in two sizes, will mill and drill at right angles and fits both the Master and the 1 H.P. Bridgeport Milling Heads. The light duty type is especially designed to mill and drill narrow, deep molds and cavities.



No. 2 Boring Head

Boring tools and holder make this attachment capable of boring holes up to 6" diameter. It is available for use on the Bridgeport 1 H.P. Milling, Drilling and Boring Attachment.

Bridgeport

TURRET MILLING MACHINE

versatility and capacity are even greater than ever before . . . through

ATTACHMENTS and a 1 H.P. HEAD

Many more operations can now be performed with speed, convenience and accuracy through the use of these attachments, specially designed for the "Bridgeport." With the step up in capacity by the 1 H.P. head, a wider variety of heavier work can now be handled on this universally accepted machine, more than 12,000 of which are busy today in tool room and production line service.

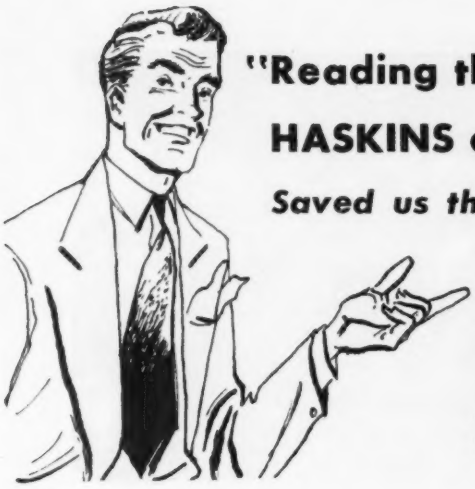
May we suggest that you get full information immediately on this machine and its attachments.

Complete details on any and all attachments and machines available promptly on request.

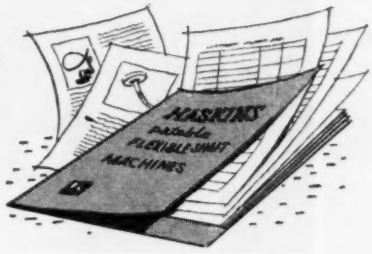
Bridgeport MACHINES, INC.

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

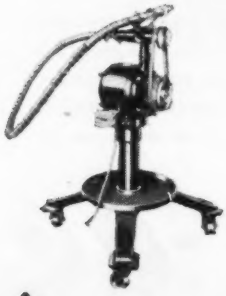


"Reading this HASKINS data file Saved us thousands of dollars!"



When you read the informative file prepared on your particular grinding, sanding, filing, wire brushing, buffing, polishing or similar operation, you too will realize the savings that Haskins Flexible Shaft Equipment can make in your plant.

Haskins has for years maintained a complete consulting and advisory service to manufacturing concerns of every size and type . . . helping them to increase production, improve standards of quality. From this wealth of experience and information, portfolios have been made that show you how savings are possible. Each data file in the series is packed with on-the-job pictures, tables and text, fully describing the many advantages obtained with Haskins Flexible Shaft Equipment.



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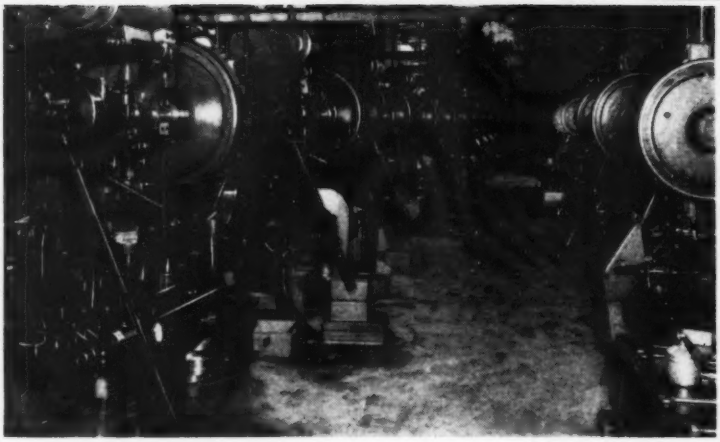

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MODEL 6-G

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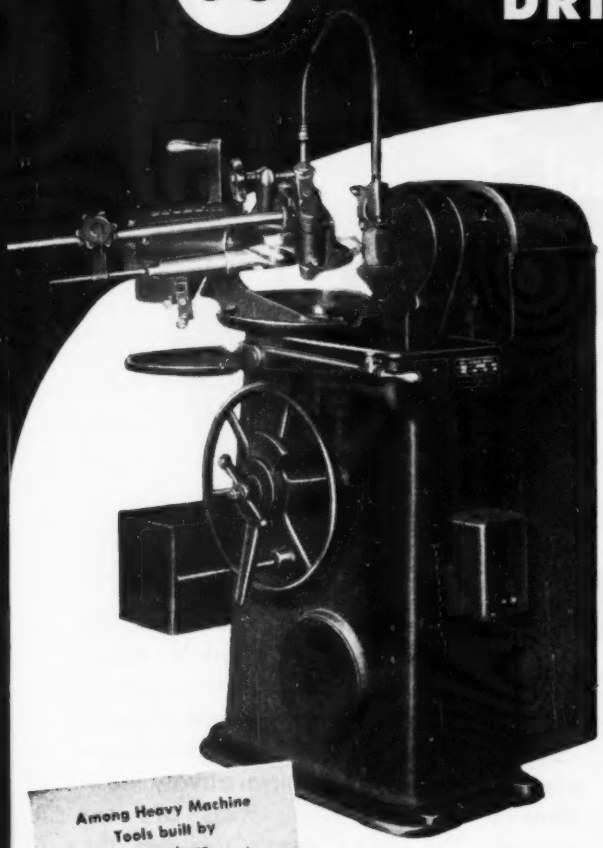

QUICKLY PAYS FOR ITSELF IN DRILL MAINTENANCE SAVINGS

- **INCREASED PRODUCTION**
  Free cutting accurate drills permit drilling machines to be operated at their most efficient speeds.
- **LONGER DRILL LIFE**
  Less drill material is ground off when re-sharpening drills.
- **MORE HOLES PER GRIND**
  Correctly ground—drills remain sharp for a greater number of holes.
- **REDUCED ASSEMBLY COSTS**
  Eliminates under- and over-size holes. Saves reaming and boring.
- **RECLAIMS DAMAGED DRILLS**
  Sellers grinding method reclaims many burned and broken drills that are ordinarily scrapped.
- **ECONOMICAL**
  This Sellers Grinder has been known to have earned its original cost as many as six times over within a single year.

Among Heavy Machine Tools built by Consolidated are . . . .

LATHES
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SLOTTERS
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The Sellers 6-G Drill Grinder provides an improved method of grinding that produces correctly formed drill points and duplicate lips. It automatically determines proper clearance according to drill size and grinds drills to equal length for use with multiple spindle drilling machines. This method materially reduces drill maintenance costs. A wet grinder that is especially adapted to grinding high speed twist drills from ¼" to 3" diameter.

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Each Glenzer Utility Sleeve supplies a removable taper shank for many small tools. Your operators get all the convenience and speed of taper shank tools with straight shank economy. Only the comparatively inexpensive straight shank tools are replaced. The Utility Sleeve supplies the taper shank for scores of them before it has to be replaced. Send for Circular A.

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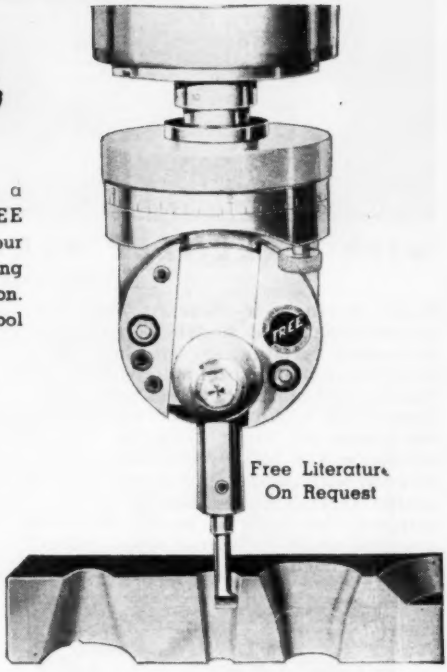
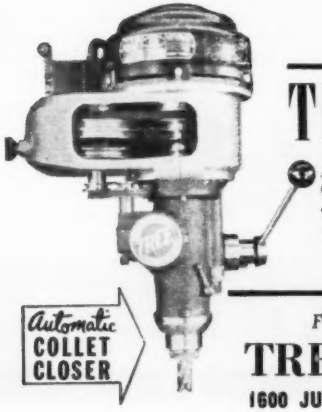
* Straight boring . . . as shown at left used as offset boring tool.

* Facing . . . up to 10" in diameter.

* Outside Turning . . . either straight or tapered up to 8" with extension bar.



Free Literature On Request



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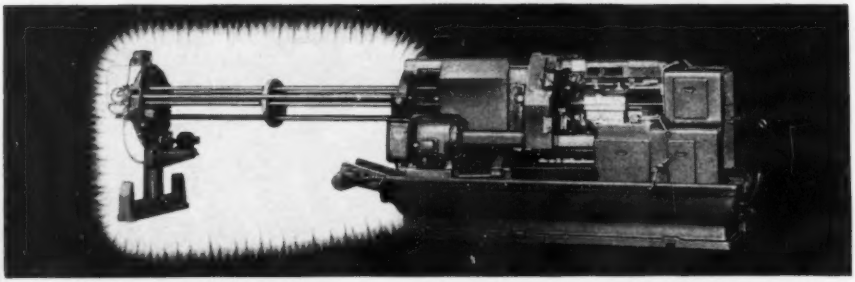
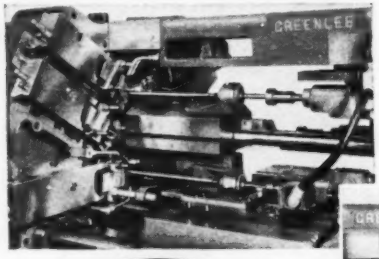
FEED OUT ANY LENGTH TO 16½" WITHOUT PUSHER MARKS!



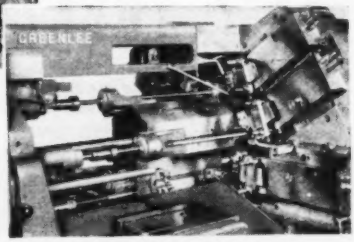
with GREENLEE AIR-FEED AUTOMATICS

Stock scoring — a necessary evil with conventional feed fingers — has often prevented certain jobs and materials from being handled on automatics, and has resulted in higher production costs. Now stock scoring can be completely eliminated by using Greenlee 1-inch 6-Spindle AIR-FEED Automatics which do away with the usual mechanical stock pusher arrangement. Instead of being gripped, the stock is moved forward smoothly and rapidly by an air-propelled piston in each stock reel tube.

There are other advantages, too. Quicker set-ups are possible by the elimination of stock pusher changes for different size stock. Multiple feed-out arrangements can be easily adapted, requiring only the setting of stock stops and collet openers at the desired feed-out positions. With only the air behind it, the stock will feed out in *any* of five positions to wherever the stop is set. On simple cut-off and form jobs, this permits production of 2 or 3 pieces per cycle. Investigate the Greenlee AIR-FEED for *your* shop.



Left, stations 1, 2, and 3 of a machine set up for multiple feed-out. The piece in this case is 16-3/32" long and requires only forming to a smaller diameter at one end. Live bushings ahead of the stops are used to prevent whipping.



Below, rear view of the same machine, showing positions 4, 5, and 6. The stock feeds out at positions 1, 3, and 5 and is formed. Cut-offs are at positions 2, 4, and 6 and chutes (not shown) are rigged to slide finished pieces away from the working area.

PRODUCTION MACHINERY

GREENLEE

GREENLEE BROS. & CO.

1831 MASON AVE., ROCKFORD, ILL.

MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

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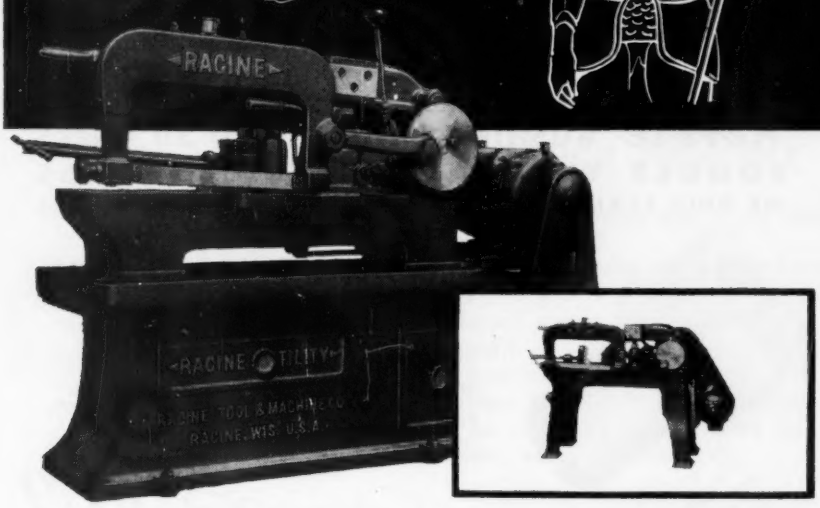

Stop the penalties, the losses, the drop in profits that old equipment costs you. Modernize the first step in your metal working processes with late design RACINE Power Saws.

A new, *all hydraulic* RACINE saw to replace worn, obsolete equipment, another unit added to your production line will pay their way in every shop.

RACINE'S line is complete — capacities 6" x 6" to 20" x 20". Single purpose and fully automatic bar feed models. A word to us about your metal cutting needs will bring carefully prepared engineering estimate sheets. Costs you nothing — can save you much. RACINE TOOL & MACHINE COMPANY, 1734 State St., Racine, Wis.

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Revere BUSHINGS WEAR 6 TO 30 TIMES LONGER THAN ALL STEEL BUSHINGS

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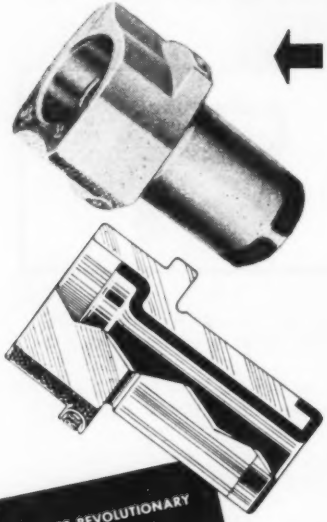

Revere Revolutionary Drill Bushings have all the accuracy of solid type bushings. Made of Super Pressed High Chrome, High Carbon Steel, Revere bushings last longer, wear better, and are assembled from complete stocks near you.

REVERE REVOLUTIONARY DRILL BUSHINGS HAVE A WEARING SURFACE HCM-HC .030 TO .050 THICK ASSEMBLED IN A DIE CAST BODY.

SAVE ON

FIRST COST
CHANGE TIME
INVENTORY
MACHINE DOWN TIME

The Revere Drill Bushing comes to you as the result of 30 years of continuous bushing experience. This experience, plus our new Revolutionary method of making drill bushings means lower cost and higher quality.

Revere Fisher ENGINEERING CO.
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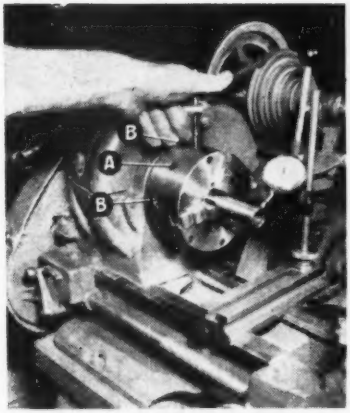
THE MOST VERSATILE CHUCK YOU CAN BUY!



FIRST CHUCK ADVANCE IN 50 YEARS!

Operating principle is revolutionary, but simple. Pinion "A" moves jaws in or out to grip work like any scroll chuck. 4 opposed screws "B" bring work to dead center. So easy that inexperienced men can center work within .0005 in 3 minutes! Once set dead true, you can machine hundreds of duplicate parts without changing adjustment!

Buck AJUST-TRU CHUCKS

NEW DESIGN PRINCIPLE

1. **Gives .0005 precision with scroll chuck rechucking speed!**
2. **Performs collet and step-collet operations!**
3. **Ends most needs for stub arbors and mandrels!**
4. **Compensates for spindle run-out — lengthens useful life of old machines!**
5. **Can be adapted to dividing heads, grinders, screw machines!**

Buck Ajust-Tru Chucks are man-hour savers on any production team. Bring new speed in setting to dead true, plus spindle collet capacity from ¼" to 1½" by .001, plus step collet capacity of ½" to 5" by .001 (on 6" chucks). Do work of special equipment worth $250 to $1,000 *at ordinary scroll chuck prices—in much less time.*

Send for literature today.

3 Step-Jaw Chuck 3 sizes— 4", 5", 6"

6 Step-Jaw Collet Chuck 3 sizes— 4", 5", 6"

6 Jaw Production Collet Chuck 3 sizes— 4", 5", 6"

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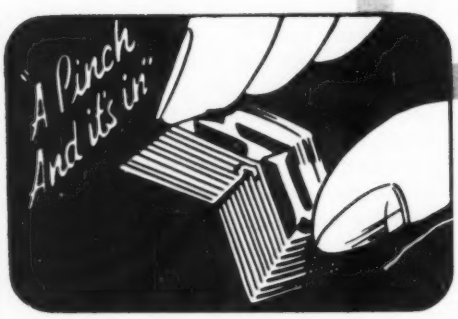
NO DELAY!

...use PANNIER National Rubber Type & Holders



• You lose no time waiting for dies or inserts to mark rush jobs when you use Pannier National Interchangeable Rubber Type and Holders. You make your own set-ups as you need them. Just "pinch" the exclusive dove-tail winged flange type into matching holder slot and there it stays without springs, wires or pins until you remove it. It can't fall out or shake loose.

Both type and holders are available for every mill and industrial need. Ask for Bulletin NT-2.

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MTBB
JANUARY 1951

featured in this issue

MAPI Replacement Formula, by William F. Schleicher, editor of Machine and Tool Blue Book. A simplified approach to the material prepared in book form by the Machinery & Allied Products Institute (MAPI), giving information on how to determine when to replace present equipment of machine tool units. This formula has aroused considerable interest among leaders in American industry; whereas, in the past, machine tool replacements have been made by "rule of thumb", this is the first time that a competent, foolproof, scientific approach to the problem of replacement has been made. It should prove of wide interest to American industrial plant executives. Page 75

Herman Reichardt's Quizzes. Page 80-86

Norge-Chattanooga Produces 2000 High-Precision Compressors a Day, by Gerald Eldridge Stedman. Norge-Chattanooga is considered to be the highest precision plant in the South today. Modern tools, latest techniques and harmonious labor relations are setting enviable records in precision manufacturing. The plant, its tools and some of its processes are discussed. Page 106

Each of Four Huge Valves to Release 2,250,000 Gallons of Water per Minute. This article describes the big machining project at the Westinghouse Electric Corporation's Sunnyvale, California works. Page 128

The Right File Cuts Filing Costs, by Stanley Livingston, Jr., research engineer, Nicholson File Co. Since the major cost in filing operations consists of labor, it is essential that the right file for the right job be used. Several basic considerations on the types of files which are available today are presented. Page 136

Letter from Great Britain, written by Robert Hutcheson, editor of "Machine Shop Magazine", London, England. This monthly feature contains up-to-date economic and industrial information on developments in the United Kingdom. Page 143

Shop Hints. Page 151

Modern Tools in Action. Page 159

How to Plan and Develop In-Plant Training Programs, by Ed Mottershead. The well-known author of the "Foremanship Forum" series now presents the first of a series of four articles describing employee training and job instruction programs. This group of articles should prove both timely and helpful in the intelligent handling of industrial plant personnel. Page 174

Available Literature. Page 193

News of the Industry. Page 209

What's New in Metalworking. Page 217

Mechanics Through the Ages. Page 290

Product Index. Page 292

Index to Advertisers. Page 298

4-Man Shop with a FUTURE

● This small shop houses a successful and growing business due to continuous high standards of accuracy.

Quality equipment pays the small operator as well as the large.

The Schoening Machine Service, 3284 Dunn Street, Cincinnati, Ohio—business, production machining—small in size—big in accomplishment—testifies to the value of fine tools.

The Cincinnati Bickford Super Service Upright Drill, illustrated, is drilling five $\frac{1}{4}$" holes and four $\frac{1}{2}$" holes to a plus or minus .005" tolerance in a steel cover $\frac{1}{4}$" thick—a production job.

Mr. Schoening tells us he has held accuracy to a plus or minus .0002" on production reaming jobs.

Write for Bulletin No. U-25.

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Radials 7½" dia. col. 2½' arm to 16" dia. col. 12' arm.
General purpose Uprights, 21" to 28" sizes.
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Equal Efficiency of Every Unit Makes the Balanced Machine

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MTBB
JANUARY 1951

as the editor sees it

How About a Law for Being Good?

We have recently seen a number of bulletins published by various manufacturers which list a long line of misdemeanors and the resulting punishments which will be meted out to workers who violate any of the company rules. As new workers are substituting aprons for overalls and exchanging lounge chairs for the high inspectors' stools, it is only natural that these workers be informed of those regulations which contribute to the harmonious relations in a plant. For instance, in one plant if a worker is tardy five times a week he is laid off for a day, during which day of leisure he can either philosophize on tardiness and idleness, or fix his alarm clock, or hang his storm windows.

No man can find fault with company rules. They are as essential to the smooth functioning of a manufacturing concern as they are to the maintaining of an even tenor in our society. Whether in business or in the community, there are rules for the bad and wicked. The world is cluttered with Verboten signs and the evil is always punishable.

But there is no reward in this world for being good! There is no acknowledgment to workers who obey all the regulations and rules and we sometimes wonder if there isn't too much emphasis placed on the don't-do-this-or-else school of thought and not enough on the do-right-and-here's-what-you-get philosophy.

One reason why the good workers are not given proper appreciation and rewards is because there are so many of them. After all, the delinquent workers, the idlers, and chaps who can't tell time by looking a clock in the face are in the minority. But our concern is not with the habitual offenders, our attention should be with those who occasionally find the path of obedience a little slippery and now and again skeeter off. Possibly, by having a plan of public acknowledgement, showing how it would be to the advantage of workers to obey the rules, and at the same time rewarding the consistently righteous and conscientious workers in some measure, more regulations might be minded and fewer disregarded.

This may appear as an academic problem to some, but to the manufacturer who remembers the petty labor troubles during the last war the subject is far from stuffy. Absenteeism was a national problem, as were others. With the boom mounting in production, which will necessitate the hiring of housewives, oldsters, disabled workers, and others, the problem of rewarding good work and obedience to the rules may in some measure be successful; certainly, it won't be any worse than it was during the last war.

William F. Schleicher

these heavy-duty features improve light-duty performance on . . .

LeBlond 21" Regal Lathe

13"
15"
17"
19"
21"
24"

LeBLOND REGAL LATHES

Geared Headstock
Quick-Change Feed Box
Separate Leadscrew and Feed Rod
Taper Key Drive Spindle Nose
One-Piece Apron

Why can LeBlond build these heavy-duty features into Regal Lathes . . . giving you the most rugged, dependable performance in the light-lathe class?

Because only LeBlond can tap the vast engineering and production facilities of a plant building 76 lathe models. Add to this LeBlond's 63 years of leadership in machine tool design and production . . . and you have the LeBlond *combination* for top value in lathes.

Call your nearby LeBlond distributor for more information or write—

THE R. K. LEBLOND MACHINE TOOL CO., CINCINNATI 8, OHIO

Sales Offices:
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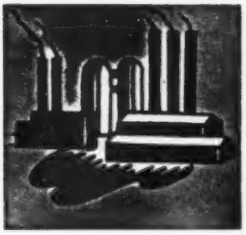
NOTE: *LeBlond also builds Regals in these models: 13" Bench 17", 19", 21", 24" Gap 17/28" and 19/30" Sliding Bed Gap.*

LeBLOND Regals

World's largest builder of a complete line of lathes



MTBB

JANUARY 1951

How's Business

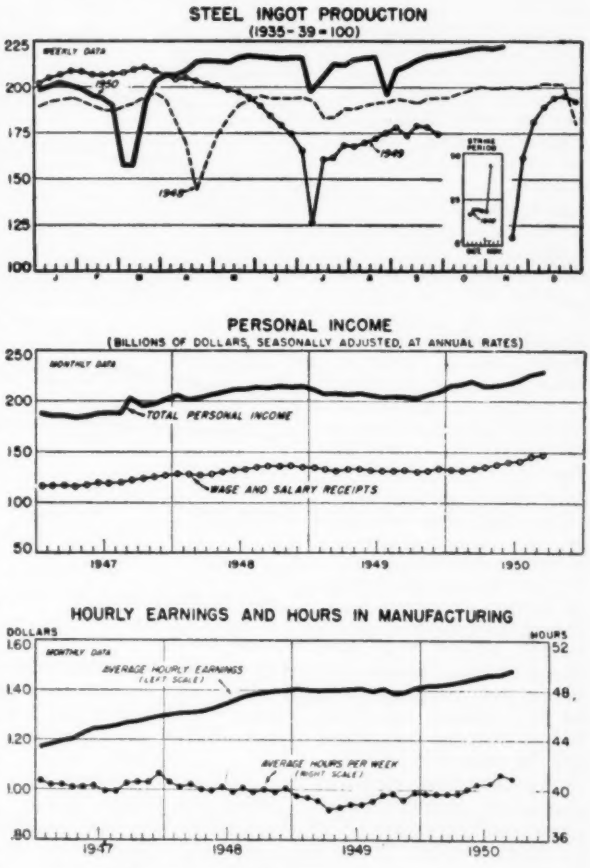
Amortization and Defense Orders

Under regulations issued by the National Security Resources Board amortization of equipment over a period of 60 months for tax purposes is possible. This 60-month amortization was authorized by the Revenue Act of 1950.

Application for permission to amortize equipment over 60 months must be made to the NSRB. This applies to sub-contractors as well as to prime contractors and both must conform to the form prescribed by the NSRB. Forms can be obtained from the NSRB, Washington, or from any field office of the Department of Commerce.

All applications received will be investigated by the department under whose jurisdiction contracts under the Defense Production Act have been awarded. This may be the Department of Commerce, Agriculture, Interior, or Interstate Commerce Commission. The agency will review the case on the basis of its justification to the defense effort and will either recommend or deny the amortization application. If recommended, the mat-

GENERAL BUSINESS INDICATORS



source: Department of Commerce

ter is referred to the NSRB who, in turn, will notify the Treasury department on whom the NSRB ruling will be binding. Your next tax return should show the emergency amortization over 60 months in lieu of the normal antiquated depreciation.

Industrial Production

During September industrial production reached the highest point since 1945. Defense orders and stepped-up consumer demand caused this tremendous output. This mighty production continued into October and November, although no figures are as yet available for these months.

Machine Tools

There was a slight drop in new machine tool orders for September from a high of 305.1 in August to 281.6 in September. However, builders are reporting longer delivery dates, in some instances to six months and more. On some special machines the delivery is quoted in years.

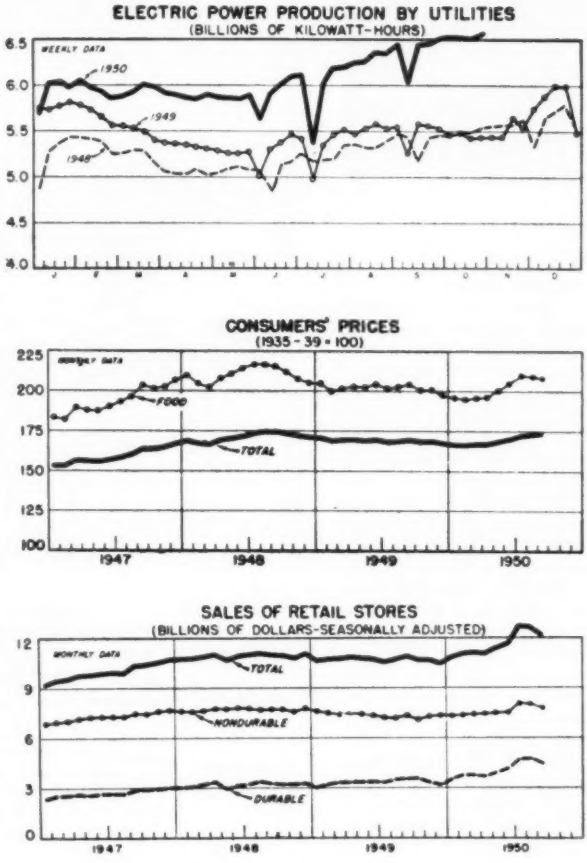
Steel for Small Business

The NPA has set up, on the recommendations of the steel industry who say that enough steel will be available for both consumer and defense production, a Small Business Division. This division looks into all requests and requirements and reports to the NPA Industry Operations Division who in turn contacts the proper industry division for action.

The NPA Iron & Steel Division has charge of steel requirements, but not copper, aluminum, etc. which are handled by other divisions. If you have difficulty obtaining steel, aluminum, copper, or other vital raw materials contact the Small Business Division. The decisions of this division will be based on "essentiality" of the use of the material. Field offices of the Department of Commerce will be of help.

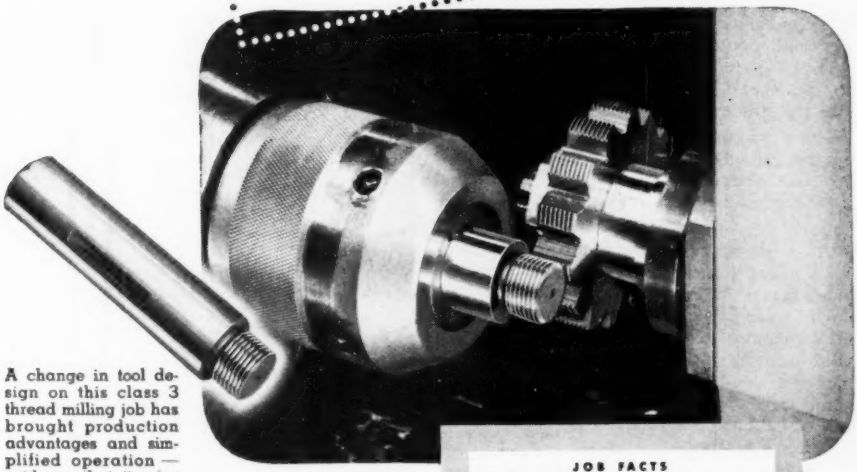
The NPA has issued order number M-6 which directs the steel mills to ship steel to their warehouses, for use of warehouse customers, a proportionate percentage of each steel product shipped to the warehouses during the first nine months of

GENERAL BUSINESS INDICATORS



source: Department of Commerce

5 REASONS WHY IT PAYS TO USE BARBER-COLMAN Job-Engineered Cutters



A change in tool design on this class 3 thread milling job has brought production advantages and simplified operation — evidence that it pays to use cutters designed to suit the job conditions.

Ground shank type thread mills previously used have now been redesigned as unground shell type cutters. In addition to the larger diameter and greater number of teeth, this design provides a rigid, short-coupled drive.

Results show: FASTER SET-UP—due to easier mounting on the machine and gaging size across an even number of teeth; EASIER SHARPENING—three cutters at a time in place of one; MORE TOOL LIFE—larger number and longer cutting teeth give 3 times as many sharpenings and 50% more pieces per sharpening; LESS TOOL COST—unground cutters produce the accuracy required; and MORE PRODUCTION—8 pieces more per hour are threaded.

JOB FACTS

Operation — Mill 3/4"-16 class 3 threads on pump shaft
Material — 4120 Steel, 25 R.C.
Cutters — B-C Job-Engineered Shell Thread Mills, 3" x 5/8" x 1"
Speed — 225 RPM

Fl-to-Fl —	Former	Present
	27/hour	35/hour
	5 sharp.,	15 sharp.,
	100 pcs.	150 pcs.
	per sharp.	per sharp.

It pays to use Job-Engineered cutting tools wherever standard dimensions will not apply. The savings speak for themselves.

FREE

Get this complete catalog of Standard and Special Milling Cutters and Reamers. Write for File No. 8847.

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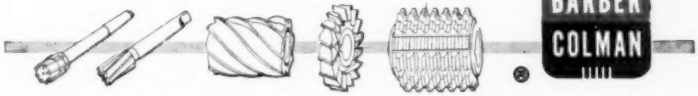
GENERAL OFFICE AND PLANT
8847 Loomis Street, Rockford, Ill., U. S. A.



1950. This is in addition to those shipments made expressly for defense orders.

Cutbacks

It is generally anticipated that first quarter cut-backs in autos, refrigerators, stoves, etc. will not be too drastic. The NPA estimates, and these are only estimates subject to change without notice, that the defense program will take 12 to 15% of all steel output in the third quarter of 1950 and about 25% in the fourth quarter. If, however, the military situation should become worse than it now is, this may be energetically changed.

Some materials will become critically scarce immediately; high alloy steels will be tight and a return to the World War II lean alloy steels is under way.

Labor

The unemployed cannot be counted upon to represent a backlog of labor, says Secretary of Commerce Sawyer. The number of unemployed dropped from 2,341,000 in September, to 1,940,000 in October. A year ago this figure was twice as large and you will remember that much was being written about the need for some sort of action if the number of unemployed continued to rise.

Total employment reached approximately 61,764,000 in October.

Among industries which will shortly be hard pressed for skilled workers will be the tool and die industry and the machine tool industry. The former is already facing a severe dwindling of skilled labor, while the latter, in some instances, is prevented from adding shifts by the scarcity of craftsmen. One answer to the problem lies in upgrading present unskilled labor into the skilled class. This will eventually clear the way to the introduction of women and other unskilled workers into the industrial family.

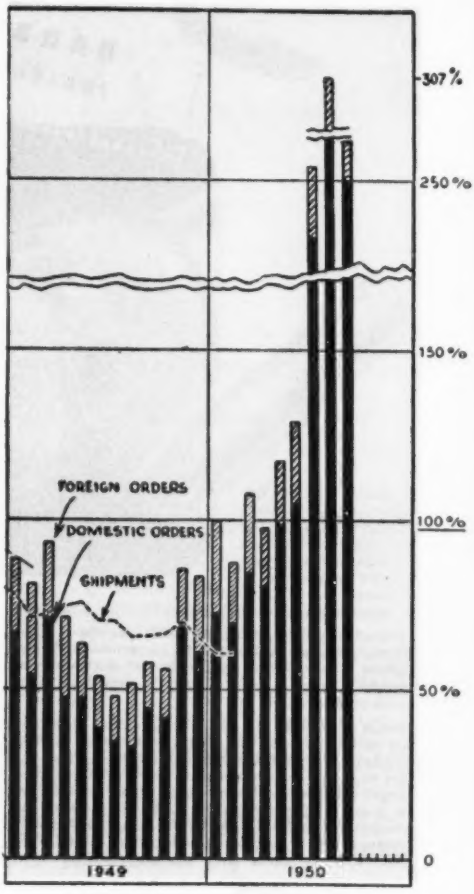
Ford and B-36 Engines

The plant which during the last war produced Wright Cyclone engines will again be pressed into service of making aircraft engines. The Ford Motor Co. has taken over the government-owned aircraft engine plant in Chicago for the purpose of producing the Pratt & Whitney Wasp Major engines, used for the B-36 bombers.

Letter contracts have been exchanged and the program should get under way at once. Formal contracts are to be signed around the first of the year.

Ford will take over the plant and such facilities as it selects, rehabilitate and rebuild, and purchase such equipment as is now in the plant.

MACHINE TOOL SHIPMENT CHART
A quantity comparison between 1949 and 1950



source: National Machine Tool Builder's Association

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The positive locking action of the end mill in its holder eliminates need of integral tapered shanks on such large operations; therefore, enables you to buy less expensive tools. Locking is sure, aided by torque of the end mill in operation; the end mill cannot possibly jar loose. POSTIV-LOK also reduces set-up and change-over time normally required on large tapered shank end mills.

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Signal of Security

Though tiny in terms of illuminating power, the glimmer of a Christmas Candle is in many ways the most piercing light in the world. For to those who would alter the meaning of American freedom, this glowing flame stands as a symbol of renewed faith in our Creator and in our inalienable rights to life, liberty and the pursuit of happiness.

Again this year it is our sincerest wish that the warming glow of the Christmas Spirit will burn bright for you and yours. And we join with you in joy and thankfulness for our many blessings in this great land of ours.

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A Special Report by the editors of Machine and Tool Blue Book

REPORT NUMBER 8

MAPI Replacement Formula

How To Determine, Soundly and Thoroughly, When To Replace Your Present Equipment

by William F. Schleicher

A decision to buy durable equipment is necessarily a long-range commitment, involving the future for many years ahead. Obviously, replacement can be timed with exactitude only when you have complete knowledge of future developments affecting your decisions. Lacking this foreknowledge, you are forced to substitute estimates and assumptions, and solve the problem on this basis. For unless you face the future for the purpose of the analysis of projecting definite values for the variables involved, the problem is really insoluble. And here lies the defect of the pay-off period, and rate-of-return methods of replacement; their assumptions as to future developments are unknown. No one knows the pattern of future events. You are shooting in the dark.

Editor's Note: This material is based on "Dynamic Equipment Policy", by George Terborgh, Research Director of the Machinery & Allied Products Institute (MAPI), and published by McGraw-Hill Book Co. The main principles of the study on replacement are published under the title "MAPI Replacement Manual" by the Machinery & Allied Products Institute, Chicago, Ill. In the present article direct quotations have been taken from the Replacement Manual and the author acknowledges with thanks permission from the Institute to do so.
The editors earnestly urge readers to obtain a copy of either the "MAPI Replacement Manual" or "Dynamic Equipment Policy"; they are essential to a modern, scientific understanding of equipment replacement. The MAPI formula takes the guesswork out of replacement estimates.

DYNAMIC EQUIPMENT POLICY, by George Terborgh, Research Director, Machinery & Allied Products Institute. Published by McGraw-Hill Book Co., New York. 1950. 285 pages. $4.50. Obtainable from Machinery & Allied Products Institute, 120 South La Salle Street, Chicago, Ill.

MAPI REPLACEMENT MANUAL. 1950. 74 pages. $3.00. Published by Machinery & Allied Products Institute, 120 South La Salle Street, Chicago, Ill.

This is the eighth in a series of special reports discussing particular types of machine tools. Instead of discussing chucking machines and turret lathes, as announced last month, this report discusses the MAPI Replacement Formula.

Part I—The MAPI Formula In Brief

The MAPI formula takes into consideration all of these factors. Instead of projecting the **future operating costs** of the present machines, it projects their **future operating inferiority.** Granted that new machines are superior to old machines, the longer you keep the old, the wider is the gap in performance between it and the new machine. This gap is called the **operating inferiority** of the present machine over the proposed machine. However, new machines cost money, and when this is taken into consideration, the gap of mechanical performance is no longer the only deciding factor in replacing. You must choose between higher capital cost and a smaller performance gap, and a lower capital cost and a wider performance gap. More precisely, you should replace when the lowest combined average of operating inferiority and capital cost obtainable from the proposed machine is below the lowest combined average of operating inferiority and capital cost obtainable from further use of the present machine.

This is precisely the function of the MAPI formula. It is designed to yield the lowest average of future operating inferiority and capital cost obtainable, or as we call it, the **adverse minimum** on each side of a comparison chart. An adverse minimum will be determined for the present machine, and an adverse minimum will be determined for the proposed machine. If the adverse minimum is lower for the proposed machine, it is economical to replace; should the present machine have a lower adverse minimum than the proposed, it becomes economical to retain the present machine. The business of replacement rests squarely on the computation and comparison of these adverse minimums.

How To Deal With The Future

When replacement analysis is made the future plays a vital part, and unless the future is fixed for the purpose of the analysis by projecting definite values for the relevant variables, the problem is impossible to solve.

It is obviously impossible, as a practical matter, to project specific estimates for each variable month by month or even year by year into the future. This would require hundreds of separate determinations for a single replacement analysis. The problem has to be simplified.

In the MAPI formula there are two principal simplifying assumptions: one for the present machine, and one for the proposed machine.

Simplifying Assumption For The Present Machine

Operating inferiority has been defined as the performance gap, or operating difference, which exists between the present machine and the proposed machine. This gap is measured on **next year's** operation only. Therefore, for the present machine, the next year **sum** of the operating inferiority and capital cost is its adverse minimum.

Simplifying Assumption For The Proposed Machine

While we can estimate the present machine's adverse minimum for next year, the calculations for the proposed machine must run into the future. While the proposed machine at present has no operating inferiority, compared to the present machine, it will accumulate

inferiority as time goes on, because future new machines will begin to compete with what is today a new machine. This future inferiority will be measured by the performance gap, or operational difference, between the aging equipment and the best machine available at any time.

Because it is impossible to determine in advance just what this operational difference will be, it becomes necessary to make a simplifying projection which is this: the proposed machine will accumulate operating inferiority at a constant rate. This makes it possible to fix the future operational inferiority of a new machine by means of an annual uniform rate of accumulation; further, it enables us to determine the lowest average of inferiority and capital cost obtainable by use of the proposed machine . . . or in other words, the adverse minimum of the new machine.

Once you have figured the next year's operational advantage of the proposed machine over the present, and have figured the capital cost of keeping the present machine another year, the next step is to read a figure from a chart and with it determine an adverse minimum for the proposed unit to tell you whether it's economical to replace the old machine at this time.

And that, briefly, is the MAPI formula.

An Example

We may be getting ahead of our story, but let's take a case history, based on what we have just discussed, and see how it works out. (We will develop the formula, and discuss some of the fine points in later paragraphs.)

First, let's figure the adverse minimum of the present machine, which is the sum of the operating inferiority of the present in relation to the proposed machine, and its capital cost. Let's assume that in your analysis the present machine is inferior by the sum of $2,500 to the proposed machine, which is to say that the proposed one will be superior in production, less down-time, less direct and indirect operating costs to the tune of $2,500. You estimate a capital cost of $300 to carry the present machine another year. That gives you an operational inferiority of the present machine over the proposed of $2,800. This $2,800 is the adverse minimum of the present machine.

Now for the adverse minimum of the proposed machine.

Let's say the proposed machine costs $10,000. You estimate a service life of 12 years, with a terminal salvage value of $1,000. This terminal salvage value is 10% of the capital cost. Now look at the chart on the next page. Under Service Life in years, find 12. Then read up on the line until you reach the Terminal Salvage Ratio of 10%, then read across and you'll hit an approximately 11% reading on the vertical scale. To this 11% add the interest rate used for the analysis, which we will assume to be 10%, giving a total of 21%. When this is applied to the $10,000 cost of the proposed machine (21% of $10,000), the answer is $2,100. This is the adverse minimum of the proposed machine. Because the adverse minimum of the proposed machine is $700 lower than that of the present, it becomes economical to replace because there will be a next year gain of that amount. (or loss if replacement does not occur).

Advantages Of The Formula

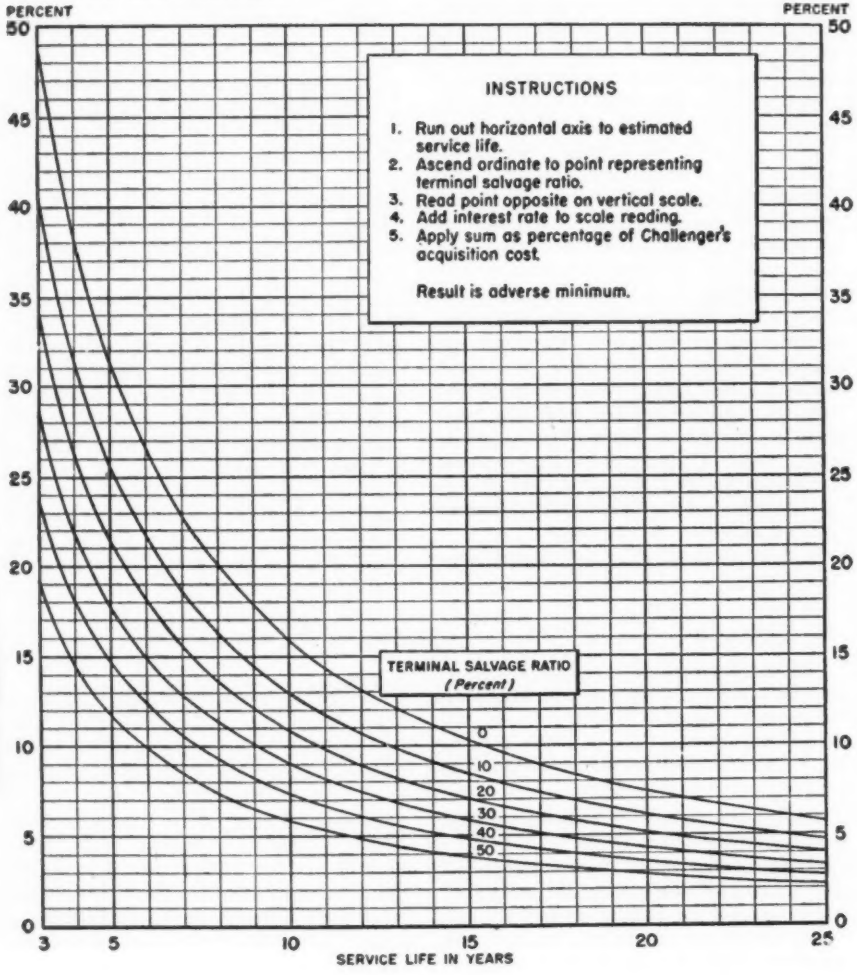
While limited space prevents us from listing all of the advantages of the MAPI formula, it may be well to mention four: 1. it takes future deterioration and obsolescence into consideration; 2. it takes cognizance of revenue differences as well as cost differences; 3. it is applicable to a combination of replacement and expansion; 4. it provides a usable measure of the cost of not replacing.

Part II—The MAPI Formula, How To Make Estimates

Since the object of replacement analysis is to find out whether the proposed machine offers a lower average of operating inferiority and capital cost than is obtainable by further retention of the present machine, it requires, obviously, two separate calculations, one for each side of the comparison. One side of the comparison is devoted to the present machine and the other de-

• • •

Fig. 1. Chart for determining the adverse minimum of the proposed machine under the MAPI Formula.



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At last—a PRODUCTION BENDER that "Bends them ALL"—tubing—angle—channel—extrusions—moulding—strip stock—bus bars—and of course—all types of solid materials. U-Bolts and Eye Bolts are just two examples of the shapes that can be rapidly produced in one operation with this hydraulic power bender.

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voted to the proposed. We will begin by examining the present machine, leaving the proposed until later.

In a foregoing paragraph we discussed a simplifying assumption for the present machine, under which the reckoning of its adverse minimum turns into an estimate of: 1. its next year operating inferiority compared to the proposed machine, and 2. the capital cost of carrying the present machine for another year. How are these estimates made?

FIGURING THE ADVERSE MINIMUM OF THE PRESENT MACHINE

1. NEXT YEAR OPERATING INFERIORITY

Include All Relevant Operating Differences

A new machine may permit an improvement in the product turned out. It may permit a wider variety of products. It may provide greater capacity. It may be more reliable, with less risk of shut-downs. Such revenue-increasing advantages figure to some degree in a large proportion of replacement situations. Where such revenue advantages are present, try, if at all possible, to include them by specific estimate in the replacement equation. You may want to call this Income Advantages.

While it is important to get these non-cost advantages into the picture, it is equally as important to get an

---

GAGE THIS QUIZ CLOSELY

By Professor Herman Reichardt, Consulting Engineer

Count ten points for each correct answer. 90-100 is excellent and you won't have to worry about a younger man taking your job; 80-80 is good and the youngsters will have to step lively; 40-50 hmmm; below 40 . . . someday you'll probably give the old timers a run for their money.

1. The adjustable gaging member is known as **set knob, gaging button,** or **anvil.** _____
2. A plug gage in the form of a diametral section of a plain cylindrical plug gage is called a **length gage, flange gage** or **flat plug gage.** _____
3. A plug gage in which the taper shank is forced into a taper hole in handle is called a **spline plug gage, taper lock plug gage,** or **cylindrical plug gage.** _____
4. The specified difference in dimensions of mating parts is called **tolerance, finish,** or **allowance.** _____
5. The bottom or greatest distance between two adjacent roots is called **size, base,** or **pitch of thread.** _____
6. An extended thread gage, employed for the control of size of threaded parts is called **snap gage, thread ring gage,** or **flat ring gage.** _____
7. The slot which passes entirely through the walls of a thread ring gage is called **tolerance, depth slot,** or **locking slot.** _____
8. The length of contact between matched threads is known as **length of thread, length of engagement,** or **degree of taper.** _____
9. The positive allowance is known as **tolerance, fit,** or **neutral zone.** _____
10. The space between the crest of a thread and the root of the matching thread is known as the **depth, tolerance,** or **crest clearance.** _____

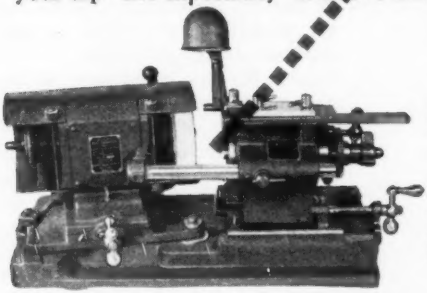
Answers to quiz on page 170

Sharpen Up!

Blake TAP GRINDERS

...Increase Your Tap "Life Expectancy"

Now you can get full production from your taps and reduce breakage due to dull chamfers. Inexpensive Blake Tap Grinders accurately, economically, and *quickly* grind uniform chamfers on 2 to 10 fluted right or left hand taps. Only a few seconds are required to insert taps for grinding and no special training is necessary for operating. Here is the easy, sure way to increase your tap "life expectancy" and save many $$.



Remember, if you grind a drill, you can't afford not to grind your taps! Sharpen Up — (With a Blake Tap Grinder, of course).

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adequate coverage of cost saving itself. Too often conventional analysis takes into consideration only the saving of direct labor. This ignores the possibility of cost saving through lower maintenance, decreased spoilage of materials, reduced overhead, lower power consumption, reduced toolroom costs, increased convenience and flexibility, etc. Too often these have been considered as "imponderables". However, well-considered estimates, even if conjectural, are almost certain to add up to a more rational result than the usual practice of lumping all the imponderables.

By way of suggesting the range and diversity of the factors that may enter into the next-year operational comparison of present and proposed machine, we have compiled a check list below. There will be few cases when all of these factors need to be taken into account. On the other hand, the list is far from complete; be always on the look-out for considerations that may have been omitted.

1. Direct Labor Saving

a. Allowable speeds or feeds of the machines may differ.

b. Operating time may differ due to location of controls, indicating devices. Automatic features may provide multiple machine operation.

c. Differences in set-up time.

d. Handling time may be reduced through automatic loading and unloading; through hydraulic or magnetic holding devices; through built-in inspection features.

e. There may be unequal requirements for the auxiliary labor used for such operations as inspection, stock supply, stock loading, moving and cleaning the product.

f. The two machines may affect differently the labor requirements of operations which preceded and followed the machine under consideration.

When computing direct labor saving, a number of items should be added to the worker's hourly rate. These include overtime premiums, production bonus premiums, annual bonus, profit sharing plans, etc. While these factors vary with employer and employee, for the purpose of replacement studies, you should multiply the hourly rate by an appropriate factor reflecting these additions.

2. Supervisory And Administrative Costs

While the replacement may not result in a change of supervisory and administrative costs, the possibility of such savings must be watched for. A reduction in direct labor cost may reduce the necessary supervisory help, or permit it to be diverted to other tasks.

Overhead savings should be the subject of specific item-by-item estimates, and should not be assumed unless warranted.

3. Maintenance Costs

a. The present machine may have deteriorated to such a point that its maintenance cost is far above that of the proposed machine. This must be figured only on the basis of normal maintenance expectancy; rebuilds or renewals are handled as capital additions.

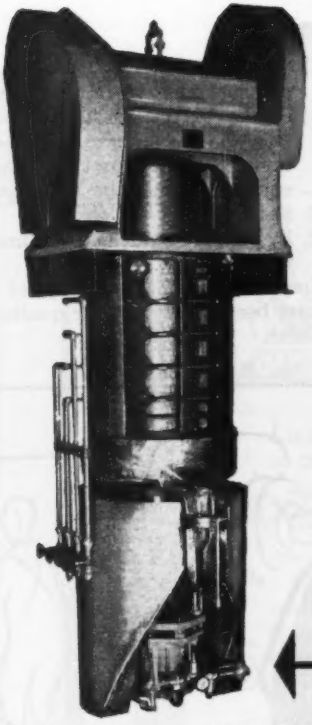
b. Figure in the difference in requirements for routine preventive maintenance, such as: time needed for lubrication, or for changing hydraulic oil, etc. The time required for these operations may vary between old and new machine.

c. The two machines may carry an unequal risk of down-time and interruption of production.

4. Cost of Supplies

a. The machines may require different cutting tools: e.g., hack saw blades vs. band saw blades, or high speed steel cutters vs. carbides.

Norgren units help put *Continuous* in Jackson & Church *Continuous* pulp presses



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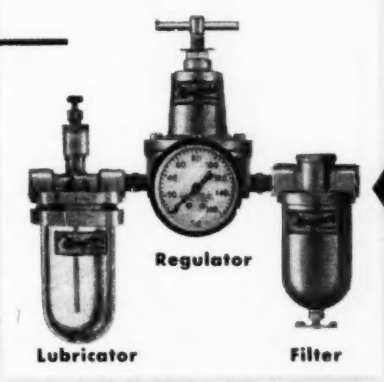

Get all details, Norgren Blueprint No. 104.

Write C. A. Norgren Co., 238 Santa Fe Drive, Denver 9, Colo.

MORAL: For cleaner, better regulated air power and automatic lubrication of air powered equipment—CHECK WITH NORGREN

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Filters, Regulators, Lubricators, Valves, Hose Assemblies.

b. They may call for different holding tools, fixtures, and attachments.
c. They may provide varying replacement times on cutting tools, due to rigidity, speeds available, and the method used.
d. They may demand different qualities and quantities of lubricants and coolants.
e. They may require hydraulic fluids in varying amounts.

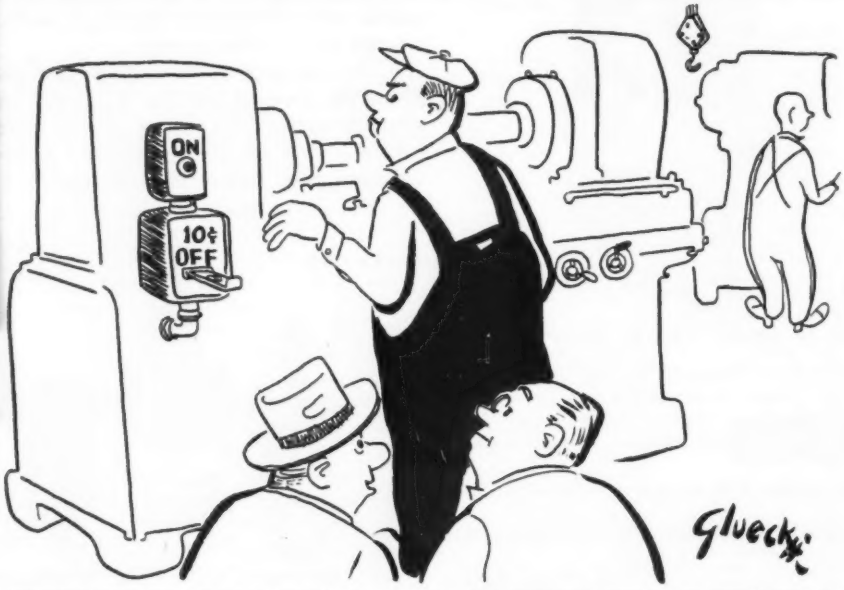
5. Miscellaneous Cost Items

a. Power. The proposed machine may require different amounts of electricity, gas, or compressed air.
b. Floor space. It may require different floor space.
c. Taxes. If the proposed machine will be subject to heavier property taxes than the present equipment, it should be debited for the difference.
d. Insurance. It should be debited also for any increase in the annual cost of fire and casualty insurance.

6. Quality Factors

The proposed machine may greatly improve the quality of the product. This may show up in two ways:

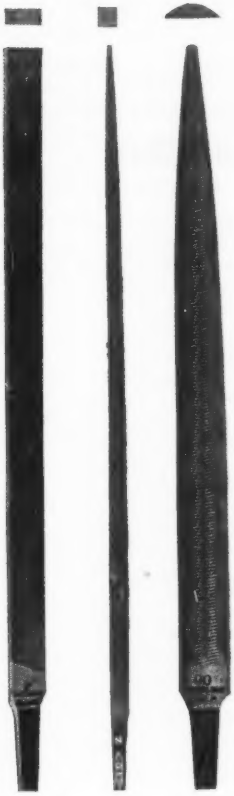
a. Reduction in cost.
   1. The proposed machine may eliminate or reduce previous secondary operations, or may improve the adaptability of the part to subsequent operations. For example, the finish may be so improved with the proposed machine that a grinding operation, necessary on the present equipment, may be eliminated.
   2. Spoilage may be reduced.
   3. Inspection reduced or eliminated.
b. Improvement in salability of the part because of its finer quality or finish.



"Making it cost a dime to shut off the machine has increased production considerably."

POP'S school of filing

AIN'T THAT JUST LIKE STOOP? HE SAYS THE FINS ON THAT DIE CASTING REMIND HIM OF THE ALPS! SO HE'S KNOCKIN' 'EM OFF WITH A SWISS PATTERN FILE!
SWISS PATTERNS ARE FINISHING-FILES--WHICH IS WHAT STOOP WILL BE WHEN POP CATCHES HIM.
HE'LL GET THE POINT--RIGHT WHERE HE DON'T WANT IT!



LIKE most production-wise foremen, Pop is a bug on the use of tools. He knows that Nicholson X.F. (Extra Fine) Swiss Pattern Files, for example, are the finest finishing files you can buy. And heaven help the man who uses 'em on the wrong jobs!

Nicholson Swiss Pattern Files are widely used for removing burs left from previous machining operations, rounding out slots, smoothing small parts, and final finishing on all sorts of delicate and intricate pieces. They come in seven degrees of coarseness and scores of shapes and sizes. Available through your industrial distributor.

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NICHOLSON . . . *a file for every purpose*

Added income from this source should be credited to the proposed equipment.

7. The Capacity Factor

The installation of the proposed machine may increase the capacity of the operation and make possible an expansion of output and sales. If the enlarged capacity is usable, any resulting increase in income should be taken into account.

Select The Proposed Equipment With Care

It may sometimes be necessary to consider replacing, not one machine, but a unit of three, five, or more machines. This occurs where a number of machines comprise a production unit. It is necessary in such a case to analyse replacement of one, three, or more machines to determine which offers the greatest benefits.

Assume you have a 10-machine grouping. Under the formula you make an analysis for 1 machine, for 3 machines, and for 10 machines. Let us say the three analyses turn out as follows:

Analysis	Adverse Minimum		Gain from Replacement
	Present	Proposed	
1 machine	$ 3,000	$ 2,500	$ 500
3 machines	15,000	18,000	— 3,000
10 machines	60,000	50,000	10,000

DROP IT IF YOU CAN'T ANSWER THIS QUIZ

By Professor Herman Reichardt, Consulting Engineer

Count ten for each question answered correctly. 90-100 is right up there with the experts; 60-80 is right up there with the people who know; 40-50 is right up there with the boys who know more about other matters; below 40, you're right there with the other good machinists who know more about machining than about forgings.

1. A cold shut is a **cold blast on metal**, a **defect in forging**, or **cold die.** _____
2. Shot blast is **breaking excess with shot**, **driving steel shot**, or **rolling casting in steel shot.** _____
3. Insert is a **piece of removable steel in die**, a **gate used in moulding**, **or a core.** _____
4. Handling holes are **holes in center of casting for holding forging**, **end holes for handling**, **or core holes.** _____
5. Tumbling is **rolling on cement for removing excess stock**, **rolling castings together to remove burs**, or **removing scales in rotating container.** _____
6. A lap is the **joining of two parts of a casting**, a **thin plate of metal on surface**, or **shaping at end.** _____
7. The fuller is the **larger portion of casting**, **the longer portion**, or **portion of die which reduces the cross section of stock.** _____
8. Section which locks into a die impression is called **shoe**, **edger**, or **undercut.** _____
9. The flash line on a forging is called the **proof**, **tonghold**, or **parting line.** _____
10. The portion of the die that distributes the metal in general proportions is known as the **sprue**, **flash**, or **edger.** _____

Answers to quiz on page 273

It is obvious that the replacement of three machines is uneconomical, while both 1-machine and 10-machine replacements deliver benefits, $500 and $10,000 respectively. It is best to replace the 10 machines for maximum returns.

Make A Comparison Chart

Having selected the present machine and the proposed machine the next move is to estimate the various factors of advantage and disadvantage on each side, being sure to make a specific estimate for each factor you can possibly evaluate.

There are several types of estimate sheets varying in details depending on the operation and the type of equipment in question. Many machinery builders and users have devised analysis sheets which are simple and easy to use. Two sample specimen sheets are shown in figures 2 and 3. Basically, an analysis sheet should look something like this:

Having shown how to obtain a value for the present machine's operating inferiority, we should consider how to get its next-year capital cost. By then combining the two we will arrive at the adverse minimum of the present machine.

II. NEXT YEAR CAPITAL COST

The capital cost of keeping the present machine in service is simply the cost of foregoing the opportunity to dispose of it. For the next year this cost is the sum of two elements:

1. the prospective loss of salvage value during the year.
2. interest for the year on present salvage value.

To obtain these, estimate only what the present machine's salvage value now is and what it will be a year hence.

Your estimates may be complicated by the necessity of making immediate and substantial expenditures for overhaul or rebuilding the present machine

OPERATIONAL COMPARISON

	Estimated Next Year Advantage (Differences Only)	
	Present	**Proposed**
1. Income Advantages	$_____	$_____
Superiority of Product	_____	_____
Increased Output	_____	_____
Other	_____	_____
2. Operating Cost Advantages	_____	_____
Direct Labor	_____	_____
Indirect Labor	_____	_____
Maintenance	_____	_____
Supplies	_____	_____
Tool Costs	_____	_____
Spoilage of Materials	_____	_____
Down-Time	_____	_____
Floor Space	_____	_____
Power	_____	_____
Property Taxes and Insurance	_____	_____
Other	_____	_____
TOTAL	$_____	$_____
Proposed machine's net advantage (present machine's inferiority)		$_____

Fig. 2 Sample comparison chart. (Gisholt Machine Co.)

EQUIPMENT REPLACEMENT ANALYSIS

(As Determined by the MAPI Formula)

EQUIPMENT UNDER CONSIDERATION

PRESENT EQUIPMENT	PROPOSED EQUIPMENT
Builder	Manufacturer
Model	Model
Year	Proposal No.
Serial No.	Estimate No.
Location	Date of Proposal

ANALYSIS OF THE JOB

(MAPI — "Operating Advantage — Next Year")

FACTOR	PRESENT	PROPOSED
(1) Superiority of Product	$	$
(2) Increased Output		
(3) Other Product Factors		
(4) Direct Labor		
(5) Indirect Labor		
(6) Fringe Benefit Costs		
(7) Maintenance		
(8) Supplies		
(9) Tools		
(10) Spoilage		
(11) Down Time		
(12) Floor Space		
(13) Power		
(14) Property Taxes & Insurance		
(15) Other Manufacturing Factors		
(16) TOTAL OPERATING ADVANTAGES	$ (A)	$ (B)

(17) *Net Operating Advantage of PROPOSED Equipment (B-A) $

ANALYSIS OF THE EQUIPMENT

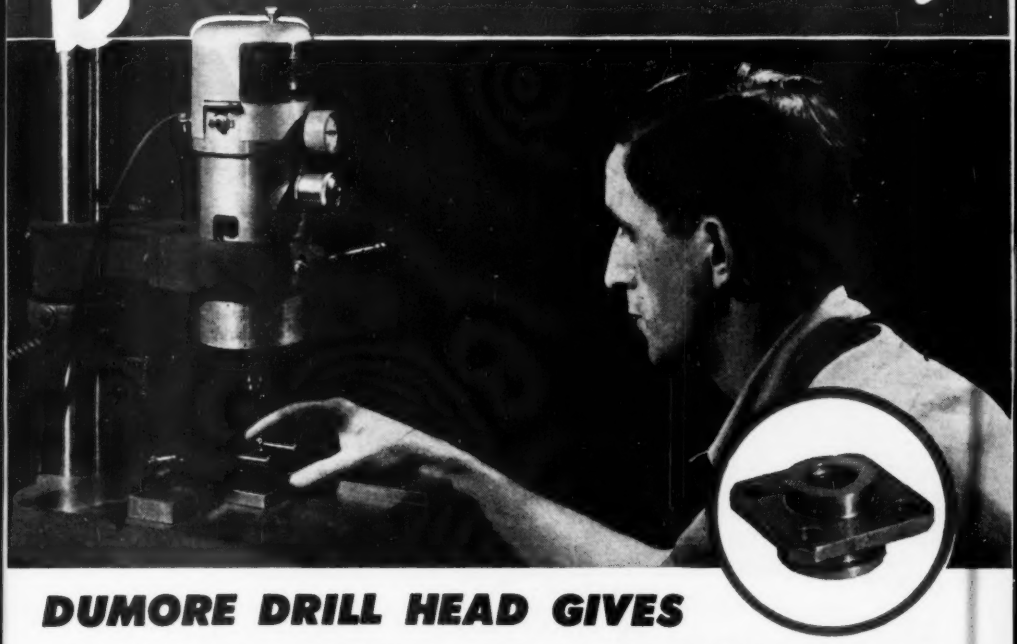
(MAPI — "Adverse Minimums")

PRESENT EQUIPMENT	PROPOSED EQUIPMENT
(18) Salvage Value — Now $	(27) Cost Installed $
(19) Salvage Value — Next Year	(28) Service Life Yrs.
(20) Loss Salvage Val. — Next Year $	(29) Salvage Value $
(20) Loss Salvage Val. — Next Year $	(30) Salvage Ratio %
(21) Interest — Salvage Val.	(27) Cost Installed (D) $
(22) Proration — Cap. Addition	(31) Chart %
(23) Interest — Cap. Addition	(32) Interest %
(24) Annual Fixed Cost $	(33) Total % (E)
(25) * Net Opertg. Disadvantage	(34) Annual Fixed Cost (D x E)
(26) Annual Operating Cost (C) $	(35) Annual Operating Cost (F) $

(36) GAIN FROM REPLACEMENT NEXT YEAR (C — F) $

Signed Date

Better check into this tool!



DUMORE DRILL HEAD GIVES 97% COST REDUCTION ON TOUGH JOB

"Saving on first 4½ hours production on this one operation, repaid the cost of the drill head," says Harold Forsmark, Chief Engineer of Stiger Precision Products, Inc., Cicero, Illinois.

OLD WAY — $.385 per piece

Problem was to drill 2 tie-wire holes at an angle thru 1"x1"x½" stainless steel nut of 15 - 20 Rockwell hardness with a No. 50 drill. Maximum production with hand-fed press was 10 pieces an hour and operator broke from 14 - 18 drills per day at a cost of 20c per drill.

DUMORE WAY — $.0117 per piece

With the Dumore Drill Head, Stiger gets 120 pieces an hour and has eliminated drill breakage and scrap loss. Says Forsmark, "We set the pressure and the compressed air chamber of the Dumore Drill Head controls it automatically and changes feed and speed to match the material. This means the drill head 'walks' right down."

If you're using No. 80 to ⅛" drills, it will pay you to get the facts on the New Dumore Automatic Drill Head. Call your Dumore Distributor today for a demonstration. Free 16-page bulletin on request.

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1951

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in order to keep it in service. Such capital additions will extend the service life of the machine and it is improper to charge them in full against next year alone. In such a case divide the expenditures by the number of years of life extension, and add the result, plus interest for one year on the total cost of the addition, to the next-year capital cost. **Be sure to add this to the capital cost you have previously determined without the rebuilding or overhaul expense.**

A few paragraphs back we showed an estimate sheet for the present machine's next-year operational inferiority. A similar sheet for its capital cost will look as follows:

CAPITAL COST ANALYSIS

1. Present salvage value	$_____
2. Estimated salvage a year hence	_____
3. Loss of salvage	_____
4. Interest on present salvage (line 1) @_____%	_____
5. **Proration** of capital addition (if any)	_____
6. Interest on capital addition (if any) @_____%	_____
TOTAL CAPITAL COST	$_____

• • •

Fig. 3. Sample comparison chart. (Warner & Swasey Co.)

THE WARNER & SWASEY COMPANY

Comparison of Total Annual Costs of Operation Based On M.A.P.I. Equipment Replacement Formula

Analysis: OPERATING COSTS	Present Equipment (differences only)	Proposed Equipment
Direct Labor		
Maintenance		
Down Time		
Adaptability of Machine to Range of Work		
Scrap and/or Salvage		
Floor Space		
Cutting Tools		
Value of Increased Output		
Power, Insurance & Property Taxes		
Indirect Labor		
Supervisory and Administrative		
Supplies		
Other		
Totals	$	$

Present Equipment

1. COST OF DEFERRED DISPOSAL:
   - Salvage Value Now. .$_____
   - Salvage Value Next Year .$_____
   - Net Loss $_____
   - Plus ____% Interest On Salvage Value Now. .$_____
   - Total $_____
2. MAJOR REPAIRS OR ADDITIONS:
   - Outlay $_____. Outlay Prorated for Next Year's Service Based On _____Years Profitable Life $_____
   - Interest On Outlay $_____
   - Total $_____
3. NET DIFFERENCE (operating costs) $_____
4. NEXT YEAR'S TOTAL COST OF OPERATION (Sum of Totals 1, 2 and 3). . . . . $_____

TOTAL ANNUAL OPERATING COSTS OF PROPOSED EQUIPMENT AVERAGED OVER ITS SERVICE LIFE *(See M.A.P.I. Chart Factors)* . . $_____

M.A.P.I. Chart Factors

a) Service Life_____Years

b) Terminal Salvage Value $_____

c) Total Investment $_____

d) Ratio of Salvage Value to Total Inv._____%

e) M.A.P.I. Factor_____%

f) Required Return on Investment_____%

g) see above--(e + f) x c = $_____
(enter this result as Item 5)

Excess Annual Cost of Not Replacing Present Equipment. . . . . $_____
(After Full Allowance for deterioration, obsolescence and recovery of the investment with interest in the proposed equipment)

Total Dollars in Excess Cost Recoverable by Proposed Equipment Over _____Years Service Life. . . . . $_____

Description:

PRESENT EQUIPMENT _____

_____

PROPOSED EQUIPMENT _____

_____ Date: _____

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You'll get the smoothest feed performance ever on Kearney & Trecker's new CK milling machines. Why? Because these CK's have a new design, heavy duty, 2" diam. table feed screw rotating through an extra-long table feed nut — giving you more bearing contact. That means Smoother Power Feed and longer screw life. Add the positive-acting backlash eliminator and you get CK's smoother, more effective climb milling. What's more, the separate motor drive for table feed is interlocked with the spindle drive motor for overload protection. No danger of stalling cutters in cut.

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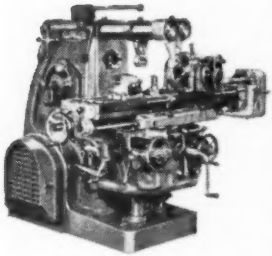
KEARNEY & TRECKER MILWAUKEE **CK's**



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Universal Style
with 5 to 1 ratio dividing head and low hood attachment

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Find out for yourself about Kearney & Trecker's new CK line of knee type milling machines . how they meet every demand of modern milling practice . . . how they can give you greater production at greater profit.

Sizes are No. 2, 3, 4, 5, and 6 . . . Plain and Universal styles. For complete details, contact your nearest representative or write direct. Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.

REPLACEMENT OF OBSOLETE MACHINE TOOLS IS AN INVESTMENT THAT MAKES BOTH DOLLARS AND SENSE

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

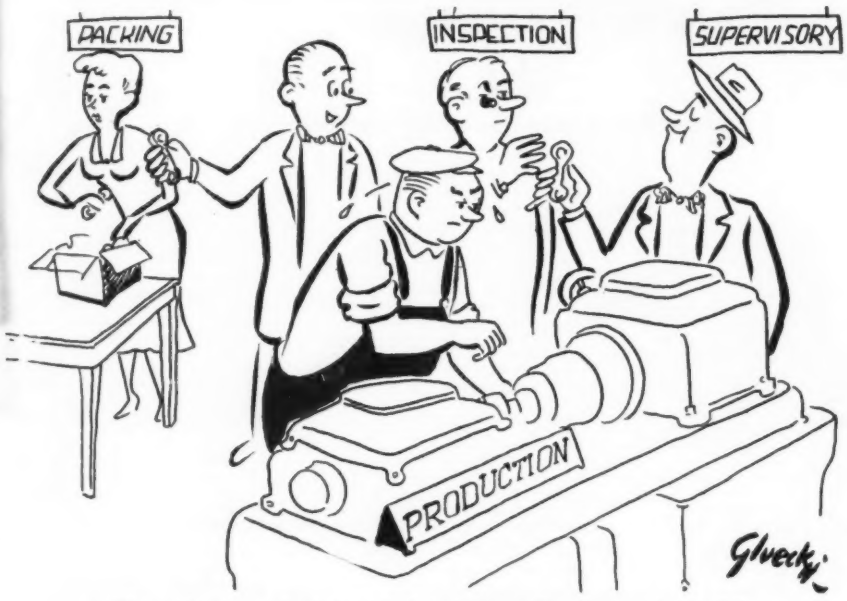
January, 1951

An Example

We have shown how the operational inferiority of the present machine is arrived at; also how the capital cost of the present machine is determined. When these two are added we have the adverse minimum of the present machine. This is then compared with the adverse minimum of the proposed machine which will be discussed next. In the meantime, it might be well to show an example of the steps just discussed in determining the adverse minimum of the present machine.

A plant is considering the purchase of a 36-inch by 16-foot openside planer to replace a 19-year old unit of comparable size. It is found that the present machine can be sold in the second-hand market for $6,000.

The new planer has a tool lifter which operates on the return stroke and makes it possible to use carbide tools. Moreover, it makes available a speed of 180 feet per minute on the cutting stroke and 300 feet on the return stroke. These advantages offer a saving of direct labor on the planing operation estimated at $1,525 a year. Because of improved lubrication, non-metallic ways, push-button control, the machine gives greater precision and a smoother surface. This eliminates secondary grinding and scraping with an estimated direct labor saving of $2,500 annually. The probable next year saving in maintenance is $200. To this is added a small saving in required floor space, valued at $60. On the debit side is an increase of $230 annually for property taxes and insurance. In tabular form, the next year operating analysis appears as follows:



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NEXT YEAR OPERATING ADVANTAGE

	Present	Proposed
Direct labor on the planing operation	$	$1,525
Direct labor on succeeding operations		2,500
Maintenance		200
Floor space		60
Taxes and insurance	$ 230	
	$ 230	$4,285
Proposed machine's net advantage (present machine's inferiority)		$4,055

Since the present salvage value of the old planer is estimated at $6,000, and since this is expected to be $5,000 a year hence, the capital cost of keeping it another year is $1,000 in loss of salvage plus $600 interest (for convenience sake we assume an interest charge of 10%), or $1,600. Adding this to the operating inferiority of $4,055 you will obtain:

Present machine's adverse minimum = $5,655.

Note that we have listed only the differences. The direct labor on the planing operation may run something like this: $7,500 for the present equipment, and $5,975 for the proposed equipment. The difference of $1,525 is listed on our estimate sheet. This is all to the advantage of the proposed machine, or conversely, to the disadvantage of the present machine, hence the term "operational inferiority."

FIGURING THE ADVERSE MINIMUM OF THE PROPOSED MACHINE

Figuring the adverse minimum for the proposed machine is a relatively easy job compared to the figuring necessary for the present machine. This is because the adverse minimum itself can be determined directly from the chart, which is based on the assumptions previously described.

Before we come to the actual solution of our problem, we should consider four preliminary steps: 1. the selection of an interest rate for the calculation; 2. the selection of the proposed machine itself; 3. the estimation of its prospective service life; 4. the estimation of terminal salvage value (if any).

Select An Appropriate Interest Charge

Whether you are using your own funds or financing from outside, it is obviously impossible to resurvey the applicable cost of money every time a replacement is made, hence it is usually desirable for routine purposes to select a standard for application to replacements in general, subject to change at appropriate intervals. Naturally, the cost of money to finance a replacement program varies, depending on the method used to obtain the money. Money can be obtained by borrowing from an outside source, equity money, or internal funds, and naturally, the cost of money will vary depending on the method used to obtain the funds. This matter deserves more attention than it customarily receives.

Select The Proposed Machine With Care

In many cases the type of machine needed to replace a present unit is evident and no further investigations into types, etc. are necessary. Frequently, however, there are a number

of alternatives which will require a formal investigation into which of them is the most beneficial. For such cases the MAPI formula can be applied to select from a number of alternatives.

Make A Careful Estimate Of Service Life

You buy a new machine tool for replacement purposes. This machine is in turn replaced by another at the end of 12 years. Instead of selling or scrapping it at that time you transfer it to lower grade service and keep it in the shop for another 10 years, when it is finally sold for junk. **It is the 12 years, not the 22, that is the service life of our formula.**

Since you are required to estimate the period within which the proposed machine, if installed, will be able to defend itself against replacement, and since variations in this estimate can have considerable effect on the calculated adverse minimum, it is essential that it be made with care. Avoid round numbers or conventional life estimates such as 10 years. Avoid also shortening of your best estimate to allow for obsolescence. As pointed out earlier, full allowance for deterioration and obsolescence is built into the formula and does not need to be made a second time by abridging the life estimate. Thus, if you say 13 years, the formula gives an adverse minimum that presupposes a steady accumulation of deterioration and obsolescence over that interval to an amount that makes the machine replaceable at the end of it.

Proposed Machine's Terminal Salvage Value, If Any

If you expect that the proposed machine will have a significant salvage value at the end of its service life, this will affect the calculation of its adverse minimum, and should be estimated. When you shift the machine into another department of your plant, you will have to make a guess regarding its conversion value.

Obtaining The Proposed Machine's Adverse Minimum

Once you have selected an interest rate, picked the proposed machine, ascertained its installed cost, and estimated its service life and terminal salvage value, if any, you are ready to compute its adverse minimum.

The mathematical formula is complex, but a chart has been developed, figure 1, which approximates the formula result very closely and requires only a moment. As indicated on the chart, you run out on the horizontal axis to the estimated service life and ascend the ordinate to a point corresponding to the terminal-salvage-to-cost ratio. This is figured in percentages. You then read the point opposite on the vertical scale and add the interets rate to the scale reading, obtaining thus the percentage which the adverse minimum is of the acquisition cost. The acquisition cost being known, the adverse minimum is at once available.

You have, let us say, a proposed machine costing $12,500, to which you give a service life of 14 years. Terminal salvage value is estimated at $1,500, or 12 per cent of cost. Interest is 10%. You run out on the chart to 14 years, ascend to approximately a 12% terminal salvage ratio (between the 10% and the 20% lines), and read the point opposite on the vertical scale. This is roughly 9%. Adding the interest rate, you obtain 19%, which applied to the acquisition cost of $12,500, gives an adverse minimum of $2,375.

SOME ACTUAL CASES

1. Gear Tooth Burring Machine

The methods department of an industrial equipment manufacturer is asked to make a study of the purchase of a machine for burring gear teeth, the object being to eliminate filing by hand, presently required on a large

percentage of the gears produced. The installed cost of such a machine is $11,350, complete with attachments and tooling.

On the basis of an anticipated production of 16,000 gears per year, divided by estimate among various sizes and types, the annual direct labor saving is computed for each classification, the total for the several classes being $3,100. Current annual maintenance on the machine is estimated at $100, property taxes and insurance at $150. The next-year operational comparison is as follows, the present machine in this case being the present hand finished setup:

	Next-Year Operating Advantage	
	Present	Proposed
Direct labor	$	$3,100
Maintenance	100	
Taxes and insurance	150	
	$ 250	$3,100
Proposed machine's net advantage (present machine inferiority)		$2,850

Since the present setup has no salvage value, hence no capital cost,
Present machine's adverse minimum = $2,850.

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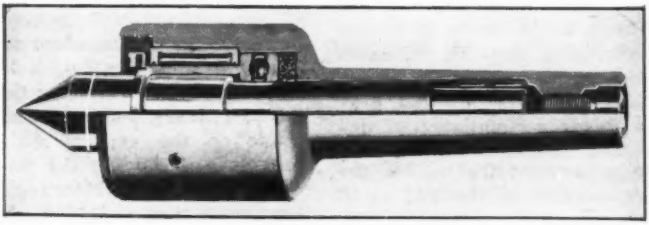

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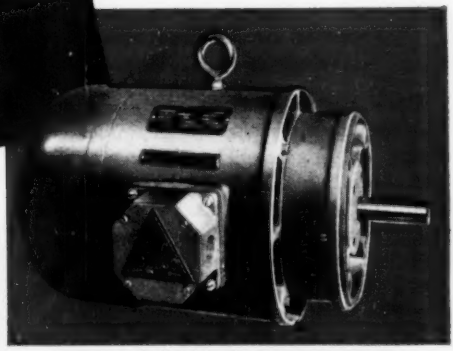
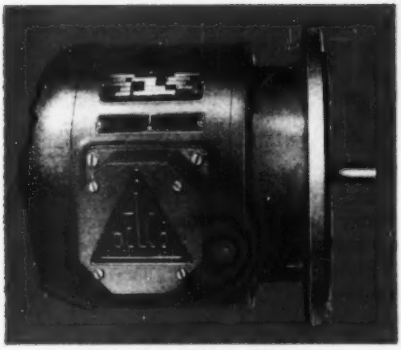


TOTALLY ENCLOSED FRAME FAN-COOLED BALL BEARING SQUIRREL CAGE INDUCTION MOTOR

Shown with C type flange. Available with C or D type flange, through 365 frame.

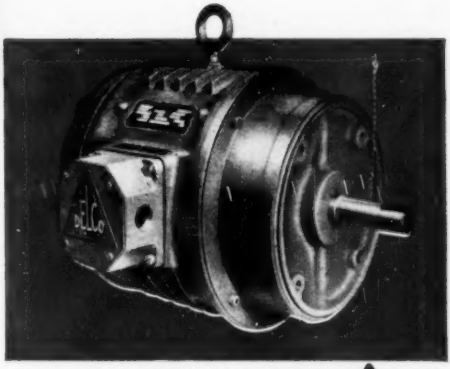


OPEN FRAME BALL BEARING SQUIRREL CAGE INDUCTION MOTOR

Shown with D type flange. Available with C or D type flange, through 365 frame.

TOTALLY ENCLOSED FRAME NOT FAN-COOLED BALL BEARING SQUIRREL CAGE INDUCTION MOTOR

Shown with C type flange. Available with C or D type flange, through 254 frame.



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Since the proposed machine is expected to be in use less than 1,000 hours per year, with wear and tear (though not, of course, obsolescence) reduced accordingly, the analyst is willing to give it a prospective life of 11 years. No terminal salvage value is projected. Reading our chart for 11 years and no salvage, he gets 14.5 per cent, to which interest is added to yield 24.5. As a percentage of $11,350, this gives:

Proposed machine's adverse minimum = $2,780

Here the replacement of the hand process by the machine is indicated, despite the omission from the reckoning of certain advantages not reduced to quantitative estimates. Thus the machine-finished gears are superior in workmanship and appearance to those hand-filed. There are other gains from the mechanization that would deserve attention in so close a case and which it might be desirable to go back and evaluate. The signal in any event, however, is for the change.

2. *Multiple-Spindle Automatic*

A manufacturer of stainless steel valves for the chemical industry is debating the replacement of a battery of 5 turret lathes, now 10 years of age, by one new multiple-spindle automatic costing $23,000. Because of the multiplicity of the operations to be performed (69 different jobs are in regular production on the present lathes) a tremendous amount of new tooling will be required if the automatic is installed, the estimated cost of this tooling being $19,000. The old lathes can be sold at about $1,500 apiece, for a total recovery of $7,500.

A careful study of set-up and cutting times on a representative sample of operations indicates that the automatic can do the work of the present turret lathes with a saving of the full time of 4 operators, plus one-fourth of the time of one set-up man and one inspector, the annual value of this saving (including the saving of fringe benefits) being $17,800. The company is willing to set a value of $500 per year on the superior quality and finish of the work done on the automatic, and $300 on the saving in stock. Annual tooling costs, which are substantial because of frequent changes in product design, in addition to normal wear and breakage, is estimated to be lower by $1,750 on the automatic. The saving in maintenance is placed at $300. With other items the operational analysis works out thus:

Next-Year Operating Advantage

	Present	Proposed
Direct labor	$	$17,800
Indirect labor		250
Quality and finish		500
Materials		300
Tooling costs (normal)		1,750
Maintenance		300
Floor space		150
Taxes and insurance	300	
	$ 300	$21,050
Proposed machine's net advantage (present machine's inferiority)		$20,750

The old lathes, now salable for about $7,500 in all, will be worth an estimated $6,500 a year hence, making their next-year capital cost $1,000 plus $750 in interest. Accordingly:

Present machine's adverse minimum = $22,500

As indicated, the new machine costs $23,000, with $19,000 additional for a full complement of tools. Against this $19,000 there is a credit, however, arising from the fact that all the tools are new simultaneously, hence the saving in tool replacement costs will be higher for a year or two than the estimated normal saving of $1,750 shown above in the operational comparison. This excess over the normal saving is estimated at $4,500 for the first year and $2,000 for the second. Deducting the combined present worths of these amounts ($5,730) from the tooling cost of $19,000, the analyst has $13,270. Added to the cost of the machine itself, this gives $36,270. With the prospective service life estimated at 9 years, and with a terminal salvage estimate of $4,000 (a ratio of 11 per cent) he reads 14 per cent from our chart, to which interest is added to bring the rate to 24 per cent. Applying this to the cost, $36,270, he has:

Proposed machine's adverse minimum = $8,705

The replacement appears long overdue without regard to the untabulated advantages. THE END.

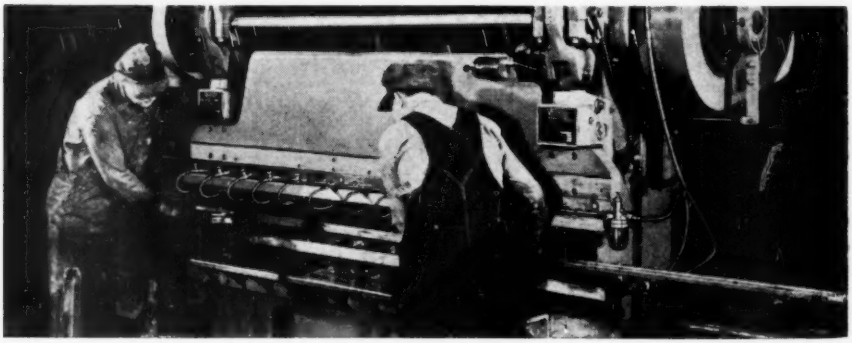
Lubricator for Punching Tools

A 30% increase in output and 50% longer life for punching tools was the direct result of installing a Norgren Lubricator and 12 Norgren low pressure Needle Valves in series on a single straight pipe on gang punch press at the Denver plant of the Sunlight Metal Products Corporation, manufactuers of metal sash.

Previous to this installation, the row of punching tools were oiled by hand by brush every 10 strokes. With the Lubricator in operation, the foot trip contacts and opens a valve releasing air automatically thru the lubricator and to each punching tool and spring-type stripper—so that the tool is automatically lubricated with an air-oil fog for every punch made.

When a new set-up of the gang of punches is required the ⅛" copper tube leading from the nearest Needle Valve is bent to direct the air-oil fog directly upon each punching tool. After this adjustment, the lubrication system requires absolutely no attention beyond an occasional refill of the lubricator reservoir.

In the Sunlight installation, a transparent bowl type of lubricator is used and the amount of oil is visible at all times. The installation was made by C. A. Norgren Co., 222 Santa Fe Drive, Denver 9, Colo.



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Sawing 16" Steel Piling

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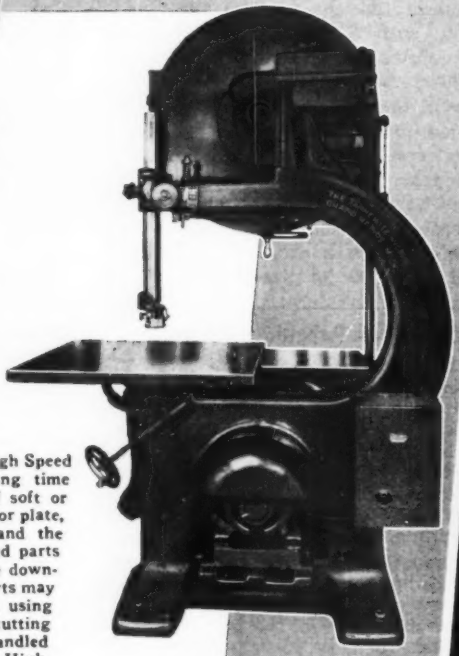

FRICTION sawing with Tannewitz High Speed Band Saws results in perfectly amazing time savings in the cutting of flat sheets of soft or hardened steels, non-ferrous metals, armor plate, glass, plastics, many other materials and the trimming of castings. For cutting formed parts there's nothing to compare with it. The down-drag of the saw is so negligible that parts may be trimmed or sawn as desired without using a rest of any kind. Whatever your cutting requirements, chances are they can be handled faster and at less cost with Tannewitz High Speed Band Saws.

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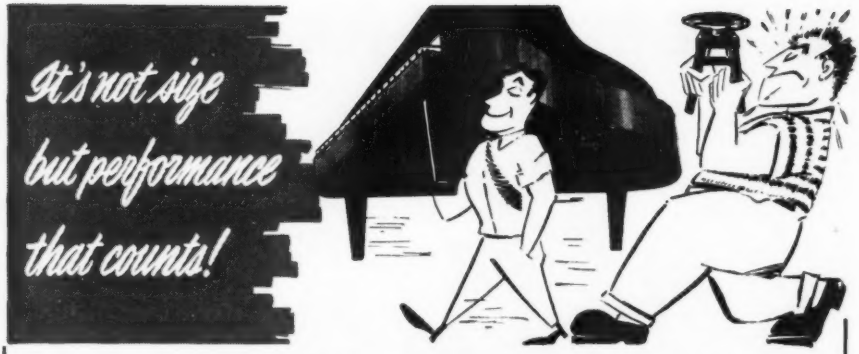

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Do 101 bending, straightening, offsetting jobs Better

When it comes to doing a man-sized job, here's a "little man" that can't be beat! KRW Hydraulic Arbor presses are being used all across the country as full-size production tools. In addition to the standard bending, straightening, flatting and offsetting operations, KRW arbor presses combined with inexpensive dies can do hundreds of other operations formerly done on costly heavier equipment. What's more, they cut your manufacturing costs by releasing heavier, more expensive presses for larger work.

KRW Hydraulic Arbor presses can be furnished for either vertical or horizontal ram travel. 25, 50, 60 and 75 ton capacities, either hand operated, air operated or motor driven.

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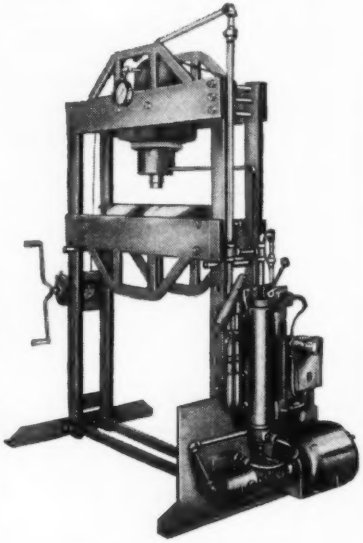
Ask your local machinery dealer to quote you prices. Or write or wire Dept. 13 *for full facts and prices.*



Illustrated is the 37MD1, *motor driven arbor press, one of the full line of standard KRW presses available for immediate delivery.*

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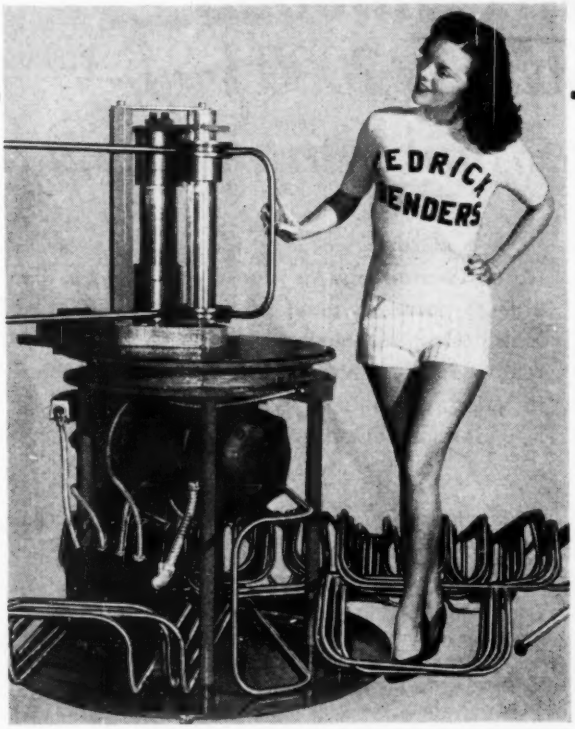
FIGURES ARE WHAT COUNT

SAVE MONEY WITH PEDRICK BENDERS



Pedrick Production Benders are inexpensive to buy. Furthermore, they are inexpensive to run. An inexperienced girl operator can get the same quality and production on one as a journeyman machinist. This is so because the Pedrick Bender does everything except think. This means that a low labor cost is realized without sacrificing the quality of the job. The result is a low cost per piece, which is the aim of all shop management.

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Bends Pipe	Bends Tube	Bends Strips	Bends Shapes	Bends Bars

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NORGE CHATTANOOGA

Produces 2000 high-precision compressors a day

by Gerald Eldridge Stedman

Norge-Chattanooga is considered to be the highest precision plant in the South. Modern tools, latest techniques and harmonious labor relations set enviable records in precision manufacturing. The plant, its tools and some of its processes are discussed.

Norge Division produces automatic refrigeration, cooking, heating, laundry equipment in complete lines and wide capacities. In 1927 through development of the Rollator compressor, having only three moving parts, Norge was first to introduce "package merchandise" into the automatic refrigerator field, sparking that r e v o l u t i o n that has now brought this facility to any plug-in electric socket. The nature of design, function and endurance of this unique compressor demands that it be one of the most accurately machined and inspected of all mechanical devices.

Norge-Chattanooga plant is devoted exclusively to this production. In my plant visit I expected to find advanced techniques. Actually, my findings far exceeded expectations. This plant is superior to many I have visited in: swift and ingenious tooling; original innovations in automatic machining; extraordinarily close tolerances in manufacturing and inspection; low scrap and rejection ratios; quantity production of quality parts; good humored relationship between individual management and shop men.

Purchased from DPC in 1946, this modern 800'x120' Chattanooga plant has 96,000 sq. ft. of which 81,000 sq. ft. is presently available for straightline manufacture. It is known as the highest precision plant in the South, and welcomes technical visitors. Norge has long led in sponsoring inter-plant visits. The plant has complete autonomy, has the single production purpose of machining and assembling the compressor which is built into the hermetically sealed unit, which in turn is jobbed to other Norge plants, including South Africa.

The plant has turned out its 1,000,-000th compressor in August, was producing 2000 units/day at my visit, has capacity of 2600/day. Labor conditions are good; supervisional ratio is one/20, about half the average in Northern automotive plants (one/9.8). Southern

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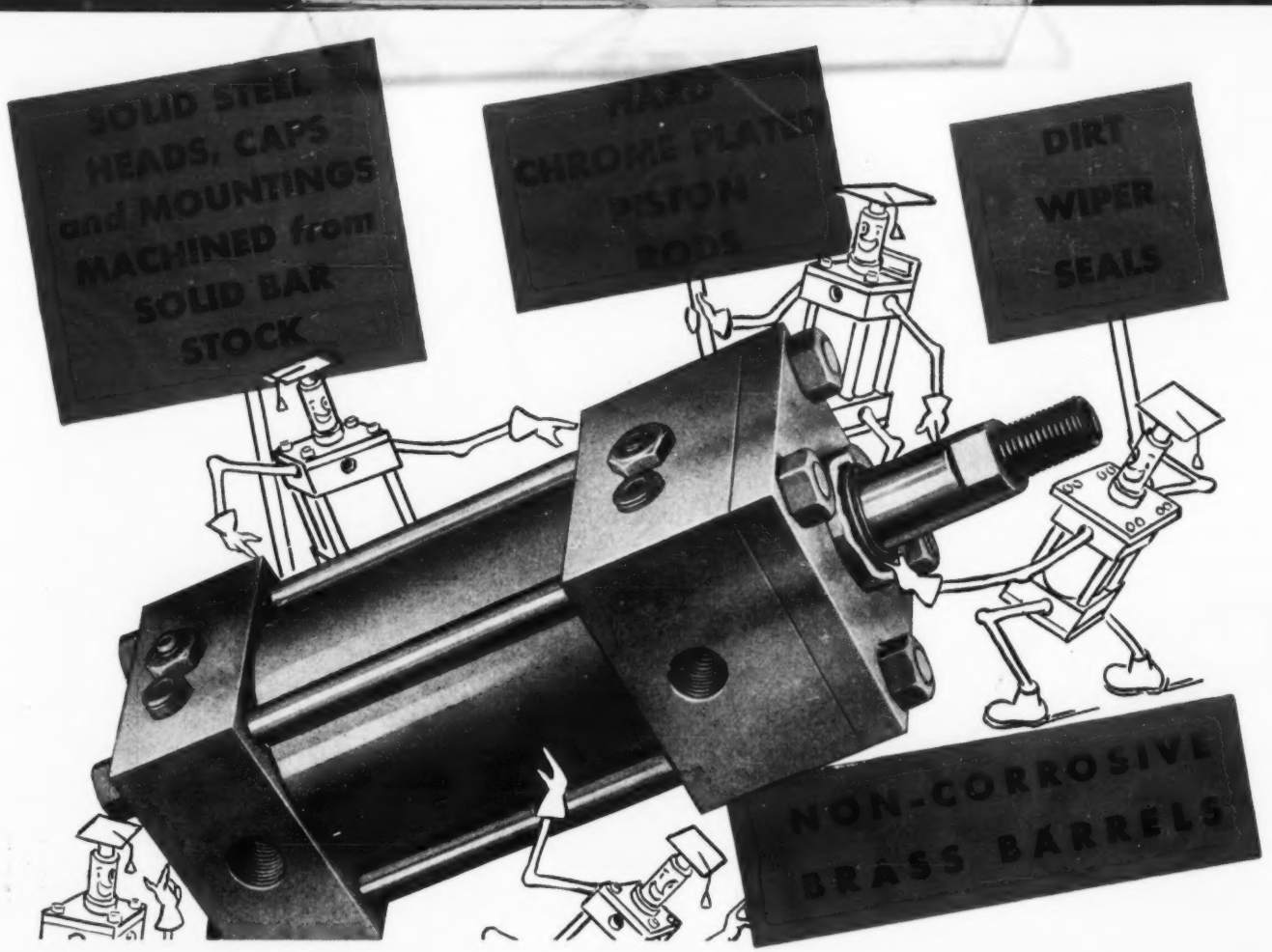
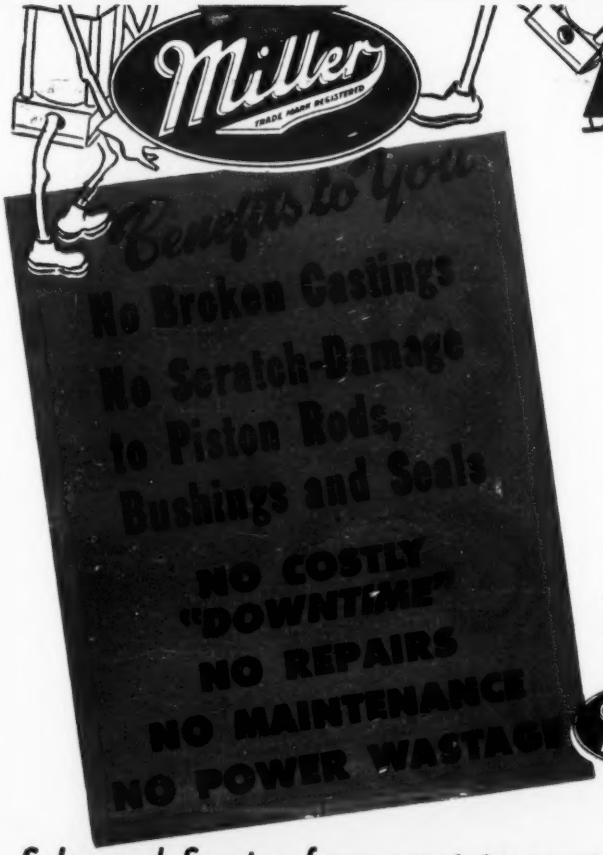

SOLID STEEL HEADS, CAPS and MOUNTINGS MACHINED from SOLID BAR STOCK
HARD CHROME PLATED PISTON RODS
DIRT WIPER SEALS
NON-CORROSIVE BRASS BARRELS



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SOLID STEEL HEADS, CAPS and MOUNTINGS. Eliminate dangerous, costly breakage under even the severest operating conditions . . . assuring longest possible cylinder life. Standard construction on ALL Miller Cylinders—*both Air and Hydraulic.*

HARD CHROME PLATED PISTON RODS. 90,000 to 110,000 psi yield point heat treated stress relieved steel, accurately ground, polished, then hard chrome plated for extra high resistance to the scratches that commonly cause leakage.

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Sales and Service from coast to coast

Fig. 1. One of many electronic inspection gauges. Parts are checked for diameter, squareness, eccentricity, and parallelism. All precision machine parts in Norge compressors are checked to within fifty millionth of an inch.

• • •

labor learned new skills fast. Women represent 15% of work force. Accident ratios, scrap loss, rework labor, idle and premium time are all unusually low. Individual and group incentives are used.

There are 17 parts involved in compressor machining, the alloys used being C 1515 speed case steel, chosen for machineability and heat treat qualities. The cylinder is close grain iron, still cast in the North because Southern irons do not have the grain structure required. Steel castings are 90% local and normalized. Production starts with sales, projected in 90-day periods. Plant laboratory is fully equipped for all metallurgical and chemical analytical requirements. Engineering department has process control divisions. Tool room is completely facilitated to make all tools designed by tool engineering.

Management officials are proud of inspection and quality control, which starts with the individual operator and is built into the product, figure 1. Actually, there is not a micrometer or snap gauge anywhere in the plant. In final lapping, even Jo-Block precision is not close enough. Dial, electronic and air gages are by machine side for each operator.

Discussing the primary elements of quality control, management stated six: 1. **Material handling:** separate baskets and compartments, specially designed for each piece and part.

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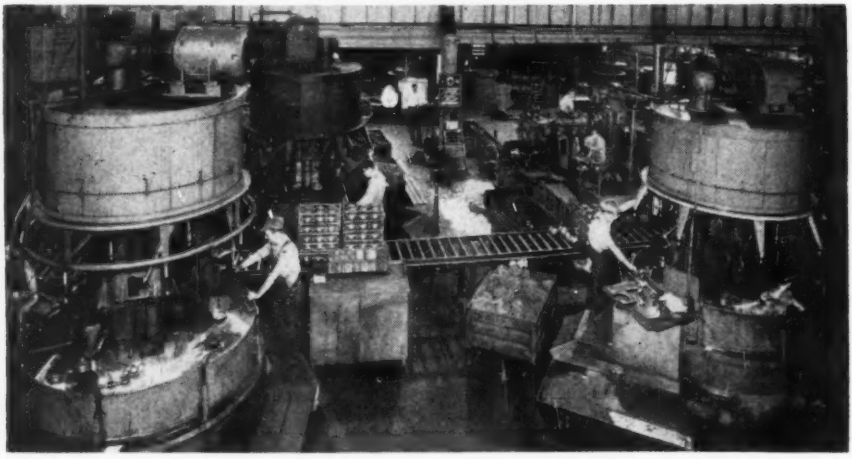
Fig. 2. Two 8" and one 12" Bullard Multi-matic chucking machines having full automatic cycle and equipped with automatic chucks. Cylindrical work is held in automatic chucks, irregular castings are held in special fixtures.



SANFORD

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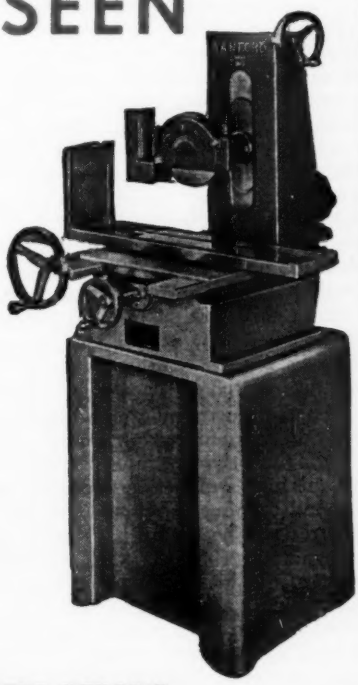
Model MG



A GRINDER

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2. **Operator:** he coordinates with inspection in quality.
3. **Electronic gaging:** limits throughout the plant are .0002" and in parts finishing are held within .00005" limit.
4. **Perfect housekeeping:** you cannot achieve precision in a sloppy shop. It makes workers careless, slovenly, loose.
5. **Good individual labor relations:** management was greeted with cordial smiles everywhere as we stopped to talk with workers as they took me through the plant.

The manufacturing operations are set up on a primary - secondary - final straight line flow that achieves high production per square feet. Primary operations involve rough machining of castings and bar stock. Most of this work is on 8" and 12" Bullard Multi-Matic chucking machines having a full automatic cycle, equipped with automatic chucks, figures 2 and 3. These are among the fastest producers in their class in industry for initial machining of forgings, short bar blanks or castings. Cylindrical work is held in automatic chucks, irregular applications in special fixtures I will mention later. A view of this section is shown in figure 4.

The shop has standard drilling equipment in capacities from smallest up to 2" dia. mostly multiple. It also uses special high production indexing drilling and tapping equipment, whose new fixtures and heads are adapted to work equivalents of 8" dia. and 10" length. Most of the tooling involved is unique. I examined a special, single purpose, seven spindle eight station indexed drill cutting from every conceivable angle simultaneously. The part was a bearing plate which required drilling several holes in sizes and at angles widely different, each from the other. It was found practical to plant the part in one of 8 circularly arranged fixtures on an index base to get the primary index action from the main table and secondary indexing from each fixture at the seven succeeding positions.

Fig. 3. View from crane showing Bullards and other machines used in primary operations.

• • •

Cutting oil is removed from screw machine chips at a handsome saving. Oil is removel by centrifugal action and extracted oil sediment filtered on the way to original storage. All automatics

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Fig. 4. View of Norge division Chattanooga plant from crane looking east. There are two 10 T cranes and approximately two miles of roller conveyors.

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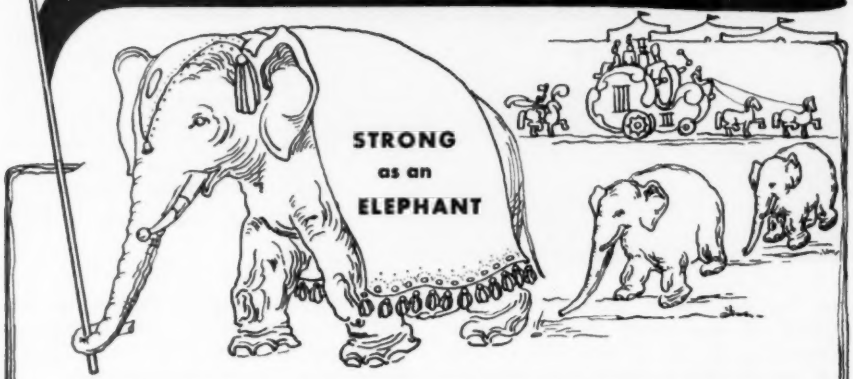

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If you owned an elephant . . . and had it trained to do your bidding . . . and gave it **plenty** of room to maneuver . . . it could **probably** do what Portelvator does . . . but it would have to be fed————————So . . . for **your** lifting and transporting jobs . . . use Portelvator . . . for Portelvator is as strong as an elephant . . . as tough as an elephant . . . can lift like an elephant . . . has four point support like an elephant . . . no more tips nor slips than an elephant . . . costs less than an elephant . . . **and doesn't eat.**

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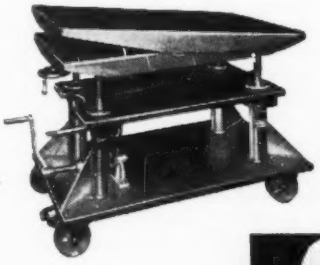
SPECIAL



A Handy Hamilton Elevating Table, especially designed and built for your particular application will "cost" you nothing, for it will pay for itself in savings. Case histories show, "production increased 45%—overhead reduced 30%"—"$2250.00 table paid for itself in 4 months"—"paid for itself in 45 days—now have nine, purchased one at a time out of savings effected."

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Fig. 5. After rough machining operations all castings are normalized and steel parts carburized, hardened and drawn. These heat treat furnaces are fully automatic and equipped with recording instruments. Equipment consists of one Hy Temp normalizing furnace, two Homo draw furnaces, four carburizing furnaces.

• • •

are supplied with temperature controlled oil piped into their respective reservoirs. Oil can be returned to original supply tank by reversing the pump motor.

All bar stock, received in ¾" to 3¾" dia. sizes is given chemical-mechanical laboratory tests. Castings require a Brinnel hardness of 100. Bar segments are normalized in three lots to a Brinnell 170-190 range.

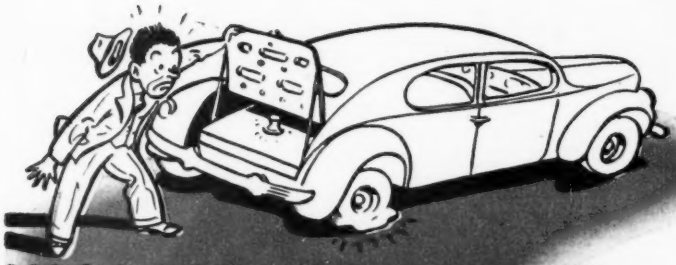
Space prevents detailing the scores of machining examples in primary production. An example is the unsual arrangement, front and rear, in machining the shaft simultaneously, forming an eccentric and at the same time generating a heliarc oil groove. There was a further unusual set up in machining this shaft, employing a rest rotating the stock that carries a bushing partly milled away to retract the part, so that the cut-off tool could not mar the cut-off on which later a truss spot required milling to 5 micros. This bushing was unusual, in that in such a protected position the work is usually achieved by transfer jaws and mechanism of complicated nature.

After primary machining oil castings are normalized and steel parts are carburized, hardened and drawn under careful laboratory control, figure 5. Heat treat furnaces are fully automatic and consist of one Hy Temp normalizing, capacity 730 lbs./hr.; two Homo-Draw, capacity 480 lbs./hr.; four carburizing furnaces, capacity 147 lbs./hr.

The automatic screw machines turn, form, drill, ream, tap or thread parts finally finished by cylindrical grinding, either internally or externally, figure 6.

The secondary machining is accomplished in air conditioned departments at a constant 74 degrees under strict atmospheric control. Six line flows are involved herein: bearing plate, cylindrical, valve plate, eccentric shaft, roller and blade—all components of the Rollator compressor.

On these lines are found much original tooling and ingenious fixturing in the variety of drilling, boring, tapping and reaming operations on automatic and semi-automatic machine tools of very latest design. There are 8 Besley grinders of the double wheel opposed grinder type for flat work, grinding both surfaces simultaneously, rapid producers of finished surfaces required to be perfectly parallel, having weight limits of 8-10 lb. parts, figure 7. The machine line up contains single-surface Blanchards, external (Cincinnati) and internal (Norton Type-C) grinders, the latter having part capacity of 6" dia.



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A machine shop foreman may be in a worse predicament without a spare arbor. When an arbor breaks, production ceases until the arbor is replaced. Machine and manpower hours wasted! Schedules disrupted! Deliveries delayed! That's why we say —

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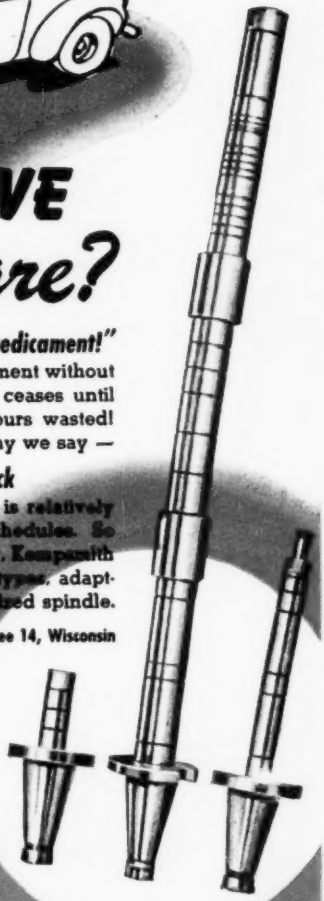

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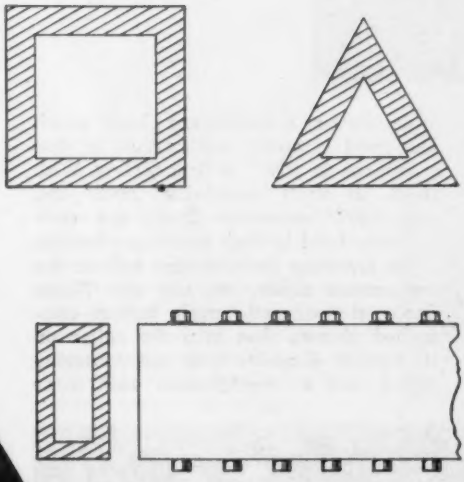

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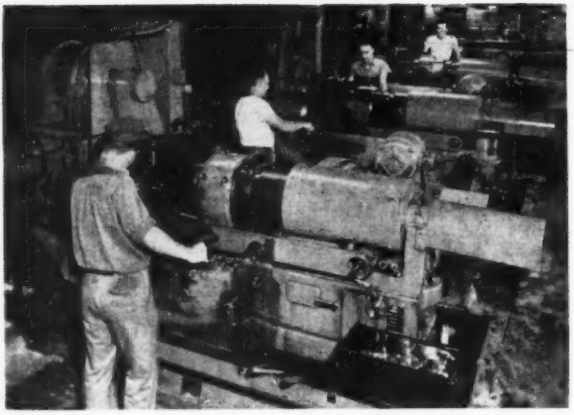

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Fig. 6. The automatic screw machine department consists of four 3¾" bar diameter, one 2" bar diameter, five 1⅜" bar diameter, one 1" bar diameter.

• • •

and 18" length. They produce high speed to high quality finish and .0001" limits. Additional Nortons are on order having very latest developments. Wide use is made of adjustable eccentric chucks. Figure 8 shows part of the grinding department.

In this secondary area 27 work sizes are held to .0002" limits on Besley grinders, Norton Hydrolaps, Excello boring machines, Micromatic hones.

Management officials explained: "We generally use a diaphragm chuck which has good grinding application, in that it returns to .0001" of first setting. With them, in shaft machining, .0002" dia. and .0002" eccentric limits are consistently held in high speed production.

"In grinding the precision hole in the compressor roller, we use two Norge designed automatic push button controlled chucks that grip the roller on its outside diameter with self-centering effect, and in combination with three

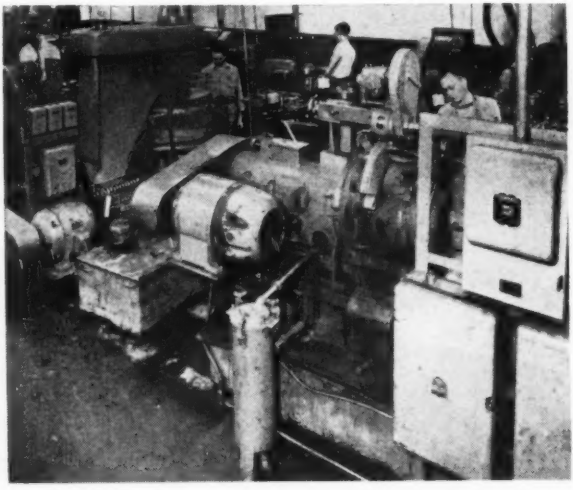

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Fig. 7. View of double wheel (opposed) grinder for flat work only, both surfaces being ground simultaneously. Weight limit on parts on this machine is 8 to 10 pounds. In addition, Blanchard grinders are used for finishing single surfaces. All machines are enclosed in an air conditioned room.

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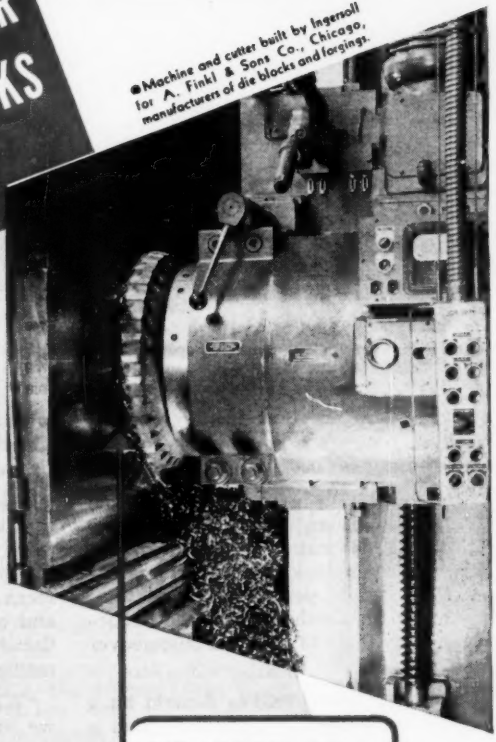
INGERSOLL

SHEAR CLEAR CUTTER MILLS DIE BLOCKS with CARBIDE



●Machine and cutter built by Ingersoll for A. Finkl & Sons Co., Chicago, manufacturers of die blocks and forgings.

● Die blocks now are being milled by this 24″ Ingersoll Shear Clear face mill with carbide-tipped blades at a feed rate 10 times as great as the feed rate obtained with high speed steel cutters. Removing surface impurities from the impression faces of die blocks is a difficult operation because of the material's extreme hardness and toughness.

This new cutter and a 60 h.p. Ingersoll Openside Milling Machine with a 22″-diameter quill have made carbide's higher cutting speed workable for die block milling. Cuts 22″ wide are taken and good finishes are obtained.

High speed steel cutters machine 15,000 square inches of this tough material in 100 hours, during which they have to be reground four times. With carbide, the same work is done in 10 hours without regrinding the cutters.

DIE BLOCK 300 to 375 BRINELL

● The experience we have gained in working on tough jobs such as this may be of assistance if you have a particularly difficult job to do in your own shop. We would appreciate an opportunity to work with you.

THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILLINOIS

Fig. 8. External cylindrical grinders. These have parts capacity of 6" dia. and 18" length, for producing quantity production to high quality finish and limits of .0001".

• • •

pull-back fingers that firmly seat the work to produce a squareness and diameter limit of .0002", figure 9.

"In connection with the application of the diaphragm chuck we have an interesting adaptation of our own design which employs coarse and fine eccentric settings, permitting reset from one model to another with dead accuracy in less than 10 minutes changeover time.

"Securely fitting valves depend on a perfect valve seat. We produce such a seat on our cylinder end plate by stopping on the valve face side of the plate a T.C.T. special formed cutter that raises the face of the iron to circular triangular form. The following grinding operation removes just the right amount of the circular triangle section to produce a valve seat having a .010-.012 flat seat band.

"Our honing machines employ electronic controls, giving the highest practical combination of production with .0002" dia. and .0001" run-out accuracy and the maximum number of holes consistent with long hone stick life. (See figure 10.)

"Cleanliness is exceedingly important in our secondary machining operations. We have found the need, not alone for the design of special washing equipment, but to use the proper chemicals and control their surface application so the residue of a first operation isn't carried to the succeeding set-up.

"We have many operations of which we are proud . . . the soft boring on compressor cylinder in which the finish bore of a 1¾" hole is held to .0002" max. error in diameter and .0001" for length of ⅝", the finish of the hole to a ±20 micros. Another example . . . we have a precision fly cut mill operation of a 9/32" slot, one inch long, held to .0002" for the 9/32" width, .0002" for parallelism and squareness with the end face of the cylinder to micro ±25 in soft steel."

Each precision operation is equipped at the machine with the latest air and

PINK ~~BLUE~~ RIBBON WINNER

for lowering metal cutting costs

• When you see how CIMCOOL° lowers metal cutting costs in your plant, you'll heartily agree it deserves a first place award. This revolutionary cutting fluid—this **chemical emulsion**—saves you money in three important ways:

• CIMCOOL INCREASES TOOL LIFE (and thus reduces down time) because of its **chemical lubricity.**

• FASTER SPEEDS are possible because Cimcool cools faster, through a unique physical change in the cutting fluid itself. Tools and chips actually stay cool to the touch.

• CIMCOOL COSTS LESS than old-fashioned cutting fluids because it lasts longer. It cuts cost of cleaning and changing.

• We sincerely believe one test run will convince you. And we're prepared to provide a demonstration in one of your own machines. Just write us and we'll have one of our Cincinnati Milling-trained machinists call on you. Or if you prefer, write for our free booklet "CIMCOOL Gives the Answers." Address, Sales Manager, CIMCOOL Division, The Cincinnati Milling Machine Company, Cincinnati 9, Ohio.

°Trade Mark Reg. U.S. Pat. Off.

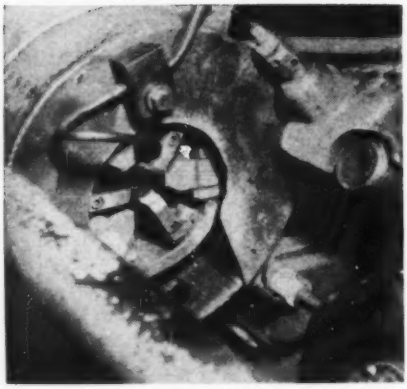


Fig. 9. Ingenious push-button controlled chucks used in grinding precision hole in compressor roller, showing full back fingers that firmly seat work for .0002" limits in high speed production.

• • •

electronic amplifying gages, necessary to the upkeep of tooling and because of the close limits and high grade finish of compressor production required by Norge standards. Each production line has its own set of final inspection gages which check parts simultaneously for diameter, squareness, eccentricity and parallelism to fifty-millionths of an inch.

In the secondary atmosphere control, air control is held to 4 gr. moisture/cu. ft., complete change each 6 minutes.

Final lapping is performed in this room to limits where standard production parts could be used for Jo-Block inspection references.

Compressor assembly is accomplished on a progressive, straight line basis, the assembly room also being atmosphere controlled, figure 11. It contains many ingenious tools, jigs, and fixtures too numerous to mention, but decidedly worthy of a plant visit to study. And Norge welcomes all to such technical observation. An interesting aspect about the assembly line is the group singing and chanting as they work, such long practice having produced amazing harmony.

In the assembly progression the main compressor casting is assembled to a nut and tube sub-assembly and checked for vacuum to assure tight fit. Norge has developed an electronic method of testing leaks that won't develop until two years from the present.

Next, the assembly involves a fine

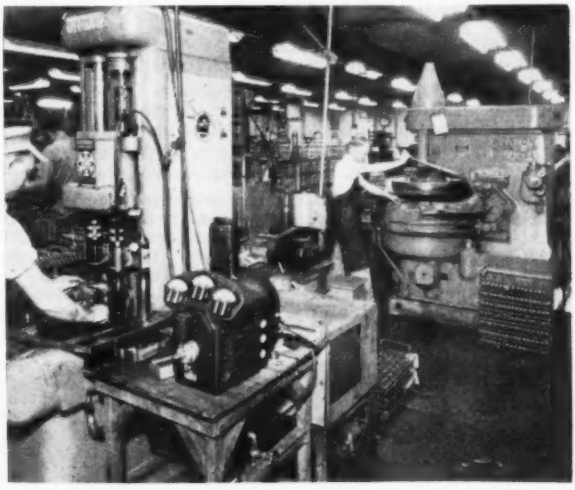


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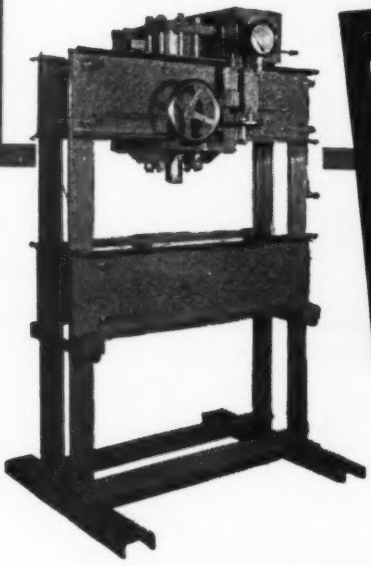
Fig. 10. A Micromatic hone and Norton Hyprolap. Both machines are held within tolerances of .00005". All finishing is done in air conditioned rooms holding constant temperature and humidity.

• • •



PRESSING POWER from a feather touch to 150 TONS

An unusual heavy duty 150 ton hydraulic press with extremely sensitive control. Operator can bend the shell of an egg without breaking it or can exert 150 tons at will.

Incomparable for riveting, pressing, bending, straightening and broaching heavy assemblies without damages due to excessive tonnage or uncontrolled power surges. Set any desired tonnage up to 150 tons, the gage mechanism prevents overload and insures accurate repeat pressures. Write for Bulletin 150 Ton. Also write for complete information on various types of air, manual, electric and hydraulic presses (17 models).

Special presses built to specifications.

LEMPCO

LEMPCO PRODUCTS, INC.
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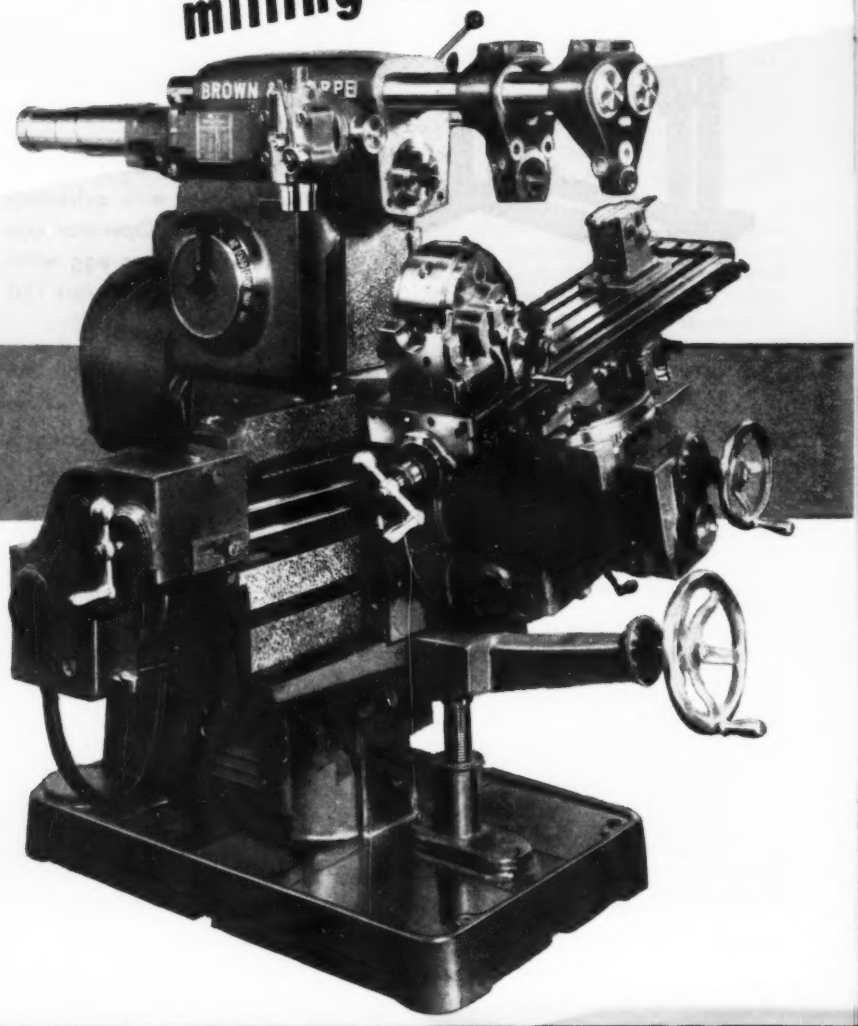
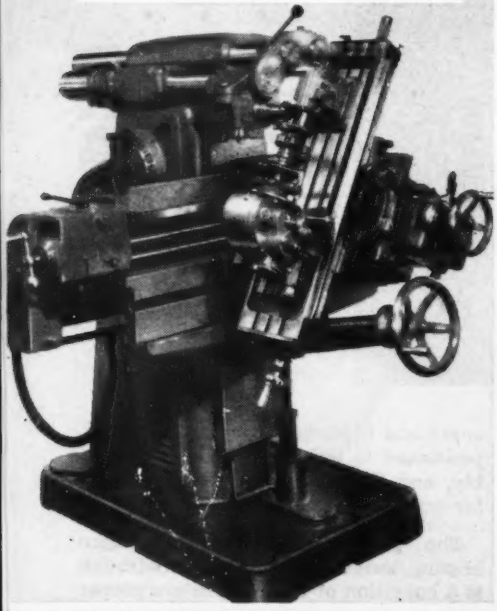
For 35 Years — a leading builder of machine tools

ANNOUNCING

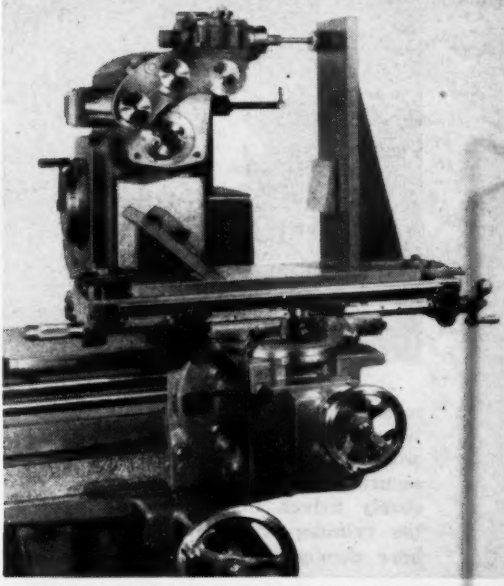
The New OMNIVERSAL milling machine



Swiveling knee permits rigid support of bevel gear on original centers throughout cutting operation . . . eliminates truing, maintains concentricity.



Omniversal milling head does face milling and boring in three planes on this large piece without resetting.



Brown & Sharpe

. . . the milling machine with unparalleled versatility!

This is it! — the ultimate in milling machine versatility for toolrooms, experimental and research laboratories —also repair shops and small-quantity production plants. The new Brown & Sharpe No. O Omniversal Milling Machine performs a wide variety of work without the need for attachments, jigs, or fixtures.

Milling compound angles, boring multiple holes from different directions, cutting teeth in tapered cutters — these and many other operations can all be done without resetting the work on the table.

Get the complete story on this outstanding machine. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

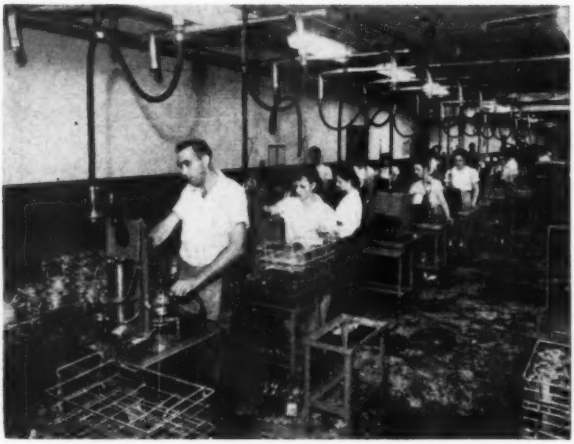


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Fig. 11. View of compressor assembly line showing overhead vacuum cleaning system which is applied to each subassembly removing all lint and dust. Each subassembly is checked by the operators on electronic gauges, aligining one part with another within a tolerance of .0001".

• • •

mesh added to the cylinder and positioned on top the bearing plate to which is pre-positioned four cylinder securing screws. These screws are securely driven home, having centered the cylinder with bearing plate shaft bore through electronically magnified gaging to a runout of .0002". Subsequently are added the cylinder, roller, valve, end plate and its cover, stator and rotor, main components of the Roll-ator.

After this, all assembled parts are pressed into a steel case motor housing. Prior to adding final elements work is checked for electrical contacts, rotation and gap clearance. Final end cover and hermetic terminal are added, positioned to the motor housing assembly, and the compressor is then ready for automatic seam welding.

The plant's methods in hydrogen brazing, automatic welding, dehydration to a condition of 150 microns are proper subjects for separate manuscript. They contain details of original techniques, just as attractive as the manufacturing prowess that is the subject of this article. It is a distinctive showplace of precision manufacture on a high speed, straight line basis. A study of it will demonstrate the futility of the Russian challenge to American industrial genius.

The End

TO INCREASE PRODUCTION AND TO IMPROVE EFFICIENCY USE

BUTTERFLY FILING AND DIE MAKING MACHINES

This is a powerful machine for heavy or small precision work in use all over the world: Airplane Factories, Aluminum Plants, Toolrooms where fast production is desired. 4 Models, No. 16, No. 14 "EL" and Model "D." The larger the Model, the bigger the stroke and therefore more filing is performed. Furnished with or without pedestals.

Constructed as per specification of U. S. Naval Aircraft Factories.

HARVEY MFG. CORP.

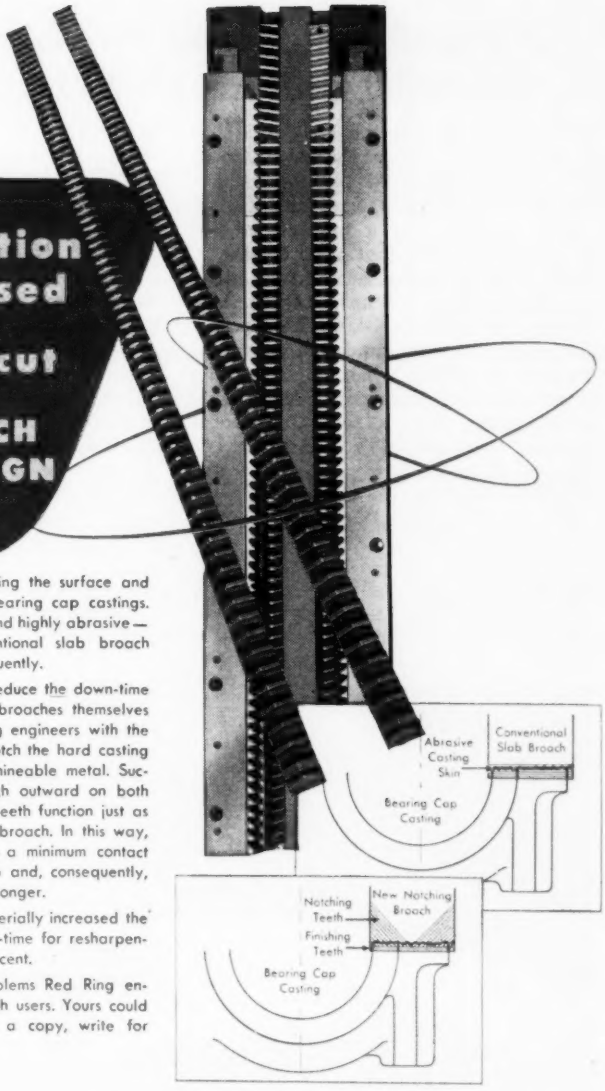
161 Grand St., New York, Phone Canal 6-5170

BEWARE OF IMITATIONS

Our machine carries the Butterfly trade mark.

Registered U.S. Patent Office

Production increased and costs cut by BROACH REDESIGN



The job in question is broaching the surface and edges of automotive main bearing cap castings. The surface skin is very hard and highly abrasive—so much so that the conventional slab broach requires sharpening very frequently.

To get more production and reduce the down-time for regrinding broaches, the broaches themselves were redesigned by Red Ring engineers with the forward teeth V-shaped to notch the hard casting surface down to readily machineable metal. Successive teeth extend the notch outward on both sides while the final finishing teeth function just as those of a conventional slab broach. In this way, broach teeth are exposed to a minimum contact with the abrasive casting skin and, consequently, hold their cutting edges much longer.

These new broaches have materially increased the parts per grind and the down-time for resharpening has been reduced 70 per cent.

This is one of the many problems Red Ring engineers have solved for broach users. Yours could be the next. If you haven't a copy, write for Bulletin 49-11 on broaching.

NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

Each of Four Huge Valves to Release 2,250,000 Gallons of Water a Minute

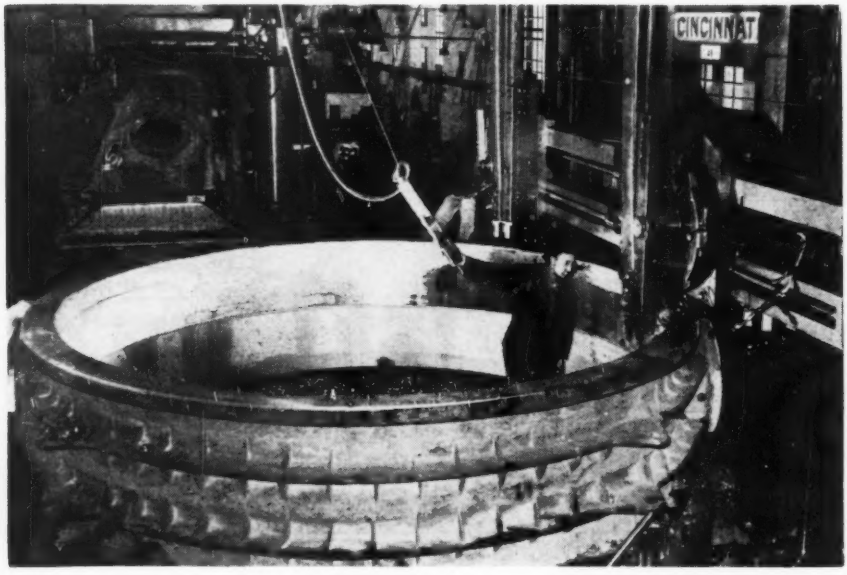
Built to scale for the big job it has to do, the huge butterfly valve shown in the accompanying pictures is designed to hold back water at a tunnel outlet portal under a pressure of 900 pounds per square foot or to release it, when desired, at the rate of two and a quarter million gallons per minute—enough to spin an 84,000 horsepower generator. To withstand the enormous weight of water when it is in the closed position, the turning disc alone weighs more than 16 tons. To accommodate the torrent of water surging through it when it is open, the valve outlet is 13 feet in diameter.

The 50-ton butterfly valve—said to be among the largest of this design ever made—is one of four identical units built at the Sunnyvale, Calif., plant of Westinghouse Electric Corporation. The valves are being installed by Pacific Gas and Electric Company at tunnel outlet portals in the new Cresta and Rock Creek developments on California's famed Feather River.

Despite their ruggedness and outward simplicity of form, the huge steel valves are actually highly precise mechanisms, constructed to machining tolerances which in some cases were as exacting as two one-thousandths of an inch. Around the perimeter of each turning disc, or leaf, is a bronze strip

• • •

Fig. 1. First major machining job on the 13-foot butterfly valve was "roughing out" the body, which weighs nearly 15 tons. Twin cutting heads remove steel under the watchful eye of a skilled machinist who must keep moving as the big table turns under his feet.



Production Pointers from GISHOLT

GISHOLT

COST CUTTING IDEAS

Gisholt—A Unique Service in the Machine Tool Industry

Here you obtain unbiased help on your turning problems, because Gisholt's broader range of equipment includes both manually operated turret lathes and automatic lathes. Gisholt's recommendations are made without prejudice for one type of machine over another.

FAST 2-OPERATION JOB MADE FASTER BY RAPID CHANGEOVER OF NO. 12 HYDRAULIC

MINIMUM TOOLING MEETS TOTAL PRODUCTION REQUIREMENTS

The low floor-to-floor time for both machining operations on these aluminum housings is typical of the efficient production you can expect from this machine. It takes but 1 minute flat for the 1st operation and only 1.5 minutes for the 2nd. And, the same machine is used for both operations. The total changeover time between operations is just 15 minutes.

SMART PLANNING

Careful planning makes this possible. Interchangeable tool blocks are mounted on the front carriage with the same mounting holes. The rear tool block is so designed that the tool bits can be quickly repositioned. Even the holding fixture is arranged so that it bolts on to the face of the 1st operation chuck. Everything is planned for a minimum of changeover effort and time.

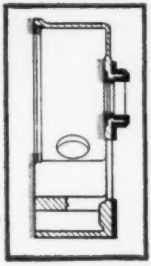
The line separates the tooling for the two operations on this housing. Tooling on the machine covers the 1st operation and tooling at the right covers the 2nd operation.

Not only is the low changeover time important, but the operator is free to handle other machines during the automatic cycle. Whether you have high or low production, this economical, single spindle machine should be investigated. Write for free literature on the No. 12 Hydraulic Automatic Lathe.

A single No. 12 Hydraulic performs both of these operations.

■ *1st operation*

■ *2nd operation*



WORTH OUT OF MAN-HOURS

TURRET LATHE AND ROLLING "MILL" IN ONE!

E

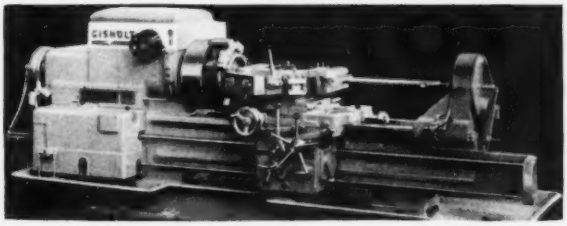
VALVE WEDGES MACHINED, SEAT RINGS ROLLED-IN —ALL BY 1 GISHOLT

Brainwork and the adaptability of Gisholt Turret Lathes really pay off.

It used to be that *three* machines were needed for machining these gate valve discs and for rolling in the seat rings. Now, with the addition of an air-operated pusher-bar to a standard 2L Turret Lathe, all operations are performed on *one* machine in one chucking.

Imagine the benefits: saving handling time and costs, freeing two machines for other work and lower labor requirements.

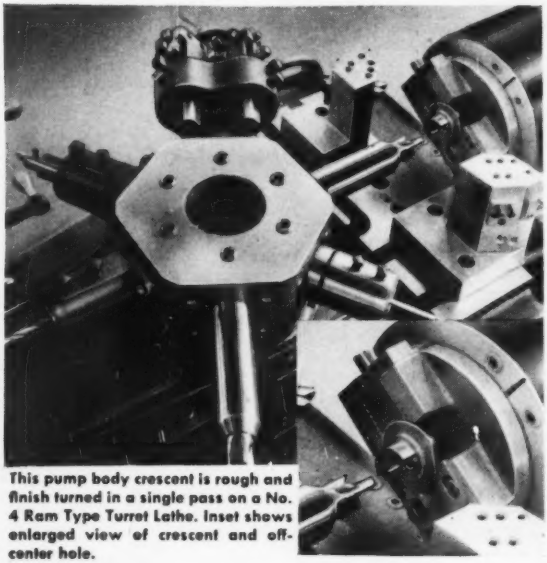
One Gisholt does all jobs on these 2 types of gate valve wedges. 1. Shows the rough casting. 2. After being faced and grooved with the dovetail recess for the seat ring. 3. With the seat ring rolled in. An air cylinder with pusher bar provides the required force to rollers carried on the third turret face. Number 4 shows completed valve wedge after seat ring is faced, turned and chamfered in place.



This Gisholt 2L Saddle Type Turret Lathe is equipped with cross-feeding turret, air-operated chuck, pusher bar.

SMART HEADWORK SPEEDS MACHINING OF PUMP BODY CRESCENT

There are two interesting features to this job—each a story in itself.



This pump body crescent is rough and finish turned in a single pass on a No. 4 Ram Type Turret Lathe. Inset shows enlarged view of crescent and off-center hole.

ROUGH AND FINISH TURNING IN ONE

On this job, they rough and finish at the same time because the surface is crescent shaped and not a full circle. The rough and finishing tools on the turret are mounted 180° apart in a special multiple turning head. While one tool is cutting, the other has no contact with the work—hence, no tool interference. Thus, the job is rough and finish turned in one pass.

ECCENTRIC MACHINING IN SAME CHUCKING

To complicate the job, the center hole and inside of the crescent were not concentric with the outside surfaces. So, a special eccentric chucking fixture was balanced for two positions and then mounted on the spindle. After turning and facing are completed, the fixture is moved to put the inside surfaces on the spindle centerline. Then, centering, drilling, reaming and counterboring are handled from the turret.

GISHOLT
COST CUTTING IDEAS

PULLEY MACHINING TIME SLASHED FROM 39 TO 13 MINUTES BY FASTERMATIC

FINISHED 66⅔% FASTER— AND IN 1 OPERATION

Machining time and costs were cut exactly two-thirds when a Fastermatic Automatic Turret Lathe took over the production of these cast-iron compressor pulleys. Also the operator is able to handle a manually controlled machine in the *free* time the automatic operation of the *Fastermatic* provides him.

The broad range of spindle speeds and feeds of the Fastermatic are extremely valuable on this job where R.P.M.s move from 36 to 184. The slow 36 is the desirable speed for machining out the V-belt grooves on the rim with form tools. For finish boring of the hub, speed goes up to 184.

SIMPLE TOOLING

Simple tooling permits all machining in a single chucking—rough and finish turning the OD., and two grooves, side facing, rough and finish boring and chamfer of the hole and spot facing of the hub. Floor-to-floor time—down from 39 to 13 minutes!

Only 13 minutes elapse from this rough iron casting to the finished pulley.

Close-up of the Fastermatic tool set-up for machining pulleys. After loading, the machine cycle is completely automatic.

IT'S DUCK SOUP FOR THE SIMPLIMATIC

BOTH ENDS MACHINED AT ONCE!

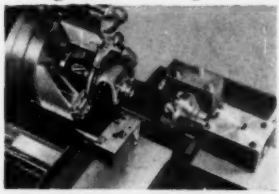
This time the Simplimatic Automatic Lathe shows its speed on a differential carrier job. There are two separate groups of tooling which give a snappy floor-to-floor time of 1½ minutes.

The first tooling group covers the conventional front and rear slides. These turn two diameters on the carrier body, and face the outer flange for the ring gear seat.

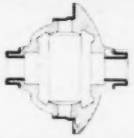
The second group consists of identical tooling on both the standard center slide and on the back boring attachment, which feeds longitudinally through the spindle. As these two sets of tools move together, both hubs are bored, faced, turned in one chucking.

With a setup like this you are machining 11 surfaces. You are saving an added operation (and the handling cost) by machining both hubs in but a single operation.

Another good example of saving with the Simplimatic.



The Simplimatic machines 11 different surfaces on both ends of this differential carrier in 1¼ minutes.



The heavy surfaces are handled by the Simplimatic in one operation. Hub at left is handled through the back-boring attachment and hub at right from the center slide. Part is chucked on the large OD.

Now Ready! Your "Equipment Replacement Analysis" Forms

The "Equipment Replacement Analysis" form (as determined by the MAPI formula) helps you to take the guesswork out of the problem of when old machine tools of all types should be replaced—to arrive at sound answers. Aids in determining what and when to replace.

Gisholt has made up this form in a handy 4-page working folder. Write for free copies today.

UNDER-PAR EFFICIENCY . . . *REPLACE NOW!*

GISHOLT

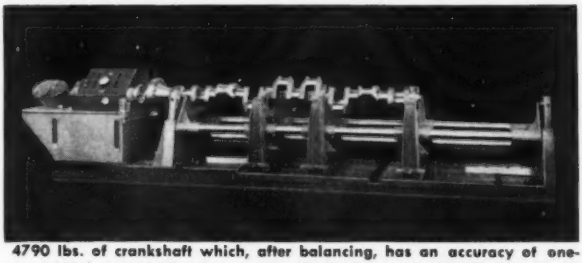
GISHOLT

COST CUTTING IDEAS

EVEN A 4800-LB. CRANKSHAFT CAN BE BALANCED WITH REAL ACCURACY

At Baldwin Locomotive Works, they know that, "If it rotates, it should be balanced." That's why the big crankshafts of the diesels which power Baldwin Locomotives are precision balanced before going into service.

A standard Dynetric Type 6-UH Balancing Machine, especially adapted for this work, is shown balancing a giant 8-throw, 4790-lb. diesel crankshaft. This one machine handles all of Baldwin's present—and future—crankshaft requirements. The machine balances these parts to such a degree of accuracy that the crankshaft will vibrate less than .0002". After unbalance is located and measured, correction is made by drilling out the excess metal.



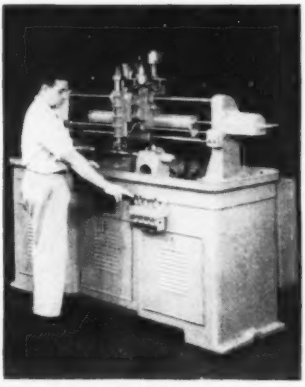
4790 lbs. of crankshaft which, after balancing, has an accuracy of one-pound-inch, or equivalent to a measurable displacement of .0002 at either end.

Such careful attention to quality is one reason these diesel-electric locomotives are constantly setting such high performance records.

Balancing is explained in a valuable 36-page booklet which is mailed free on request. Write on your letterhead.

DYNETRIC BALANCERS GISHOLT

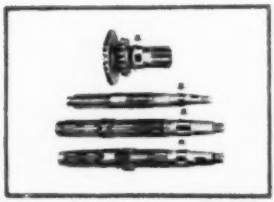
OIL SEALS REALLY SEAL—THANKS TO SUPERFINISH



Thirty-eight seconds after the operator starts the Superfinisher, the oil seal surface of this shaft is finished from 25 to 30 micro inches to 3 to 8 micro inches.

No more troubles of leaking oil seals for J. I. Case Co. Superfinish has ended them.

Many different tractor shafts and sleeves are now Superfinished—at 38 seconds per part—on a standard Gisholt Model 52A General Purpose Cylindrical Superfinishing Machine.



Here are four of the wide assortment of parts this firm is Superfinishing. Arrows show surfaces which have been Superfinished. Largest part in this photo is 24" long. Machine handles parts up to 36".

In a previous (and very economical) grinding operation, surfaces are brought down to high limits of size and a finish of 25-30 micro inches. Then operator merely loads the Superfinisher and presses a button. The machine with its *automatic* cycle provides a finish of from 3 to 8 micro inches in just 38 seconds. Changeover to other parts takes but 10-15 minutes average.

Shaft sealing surfaces are now so smooth no break-in is necessary. Leakage is reduced, higher oil pressures can be used when needed. Because there is virtually no surface roughness, the fine finish lasts indefinitely.

Write today for your free copy of WEAR AND SURFACE FINISH—an 80-page textbook on Superfinish.

GISHOLT

THE GISHOLT ROUND TABLE represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

No. 1250

GISHOLT MACHINE COMPANY
MADISON 10, WISCONSIN

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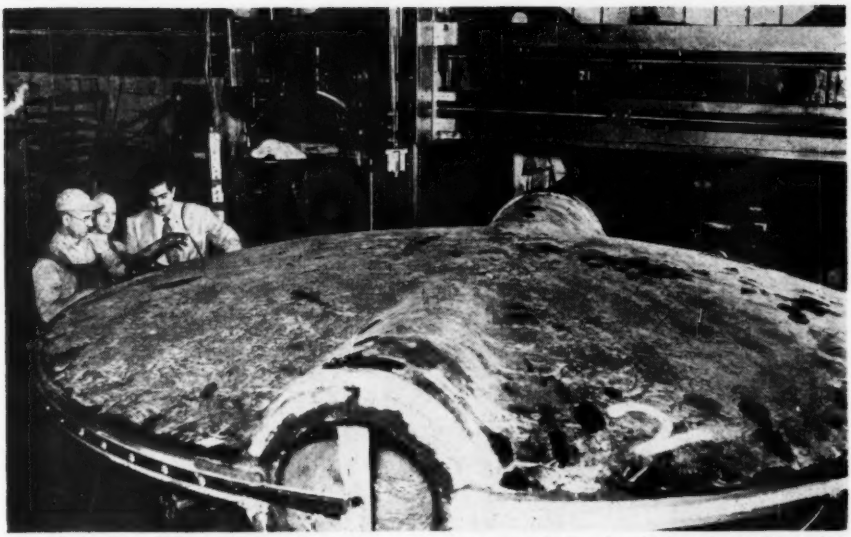

Fig. 2. Looking like a flipper from some gargantuan whale, the 13-foot butterfly valve leaf receives final touches before it is ready to be placed inside the body. A power tool fastens a strip of bronze around the rim of the 33,000-pound disc. The strip will fit tightly against a corresponding bronze strip inside the valve housing, to seal the flow of water. This picture shows the "upstream" face of the disc, which holds back the water.

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which fits against a corresponding bronze lined section of the housing. When the valve is closed, there is no clearance between the two. This metal-to-metal fit makes an effective water-tight seal, sturdy enough to resist the pressure of the 145-foot head of water in the tunnel.

Fig. 3. The butterfly valve disc is slowly lowered inside its housing under the careful scrutiny of craftsmen. A bronze ring in the housing is adjusted later against the disc to insure a near positive water seal. Showing in this picture is the back, or "downstream" face of the disc.

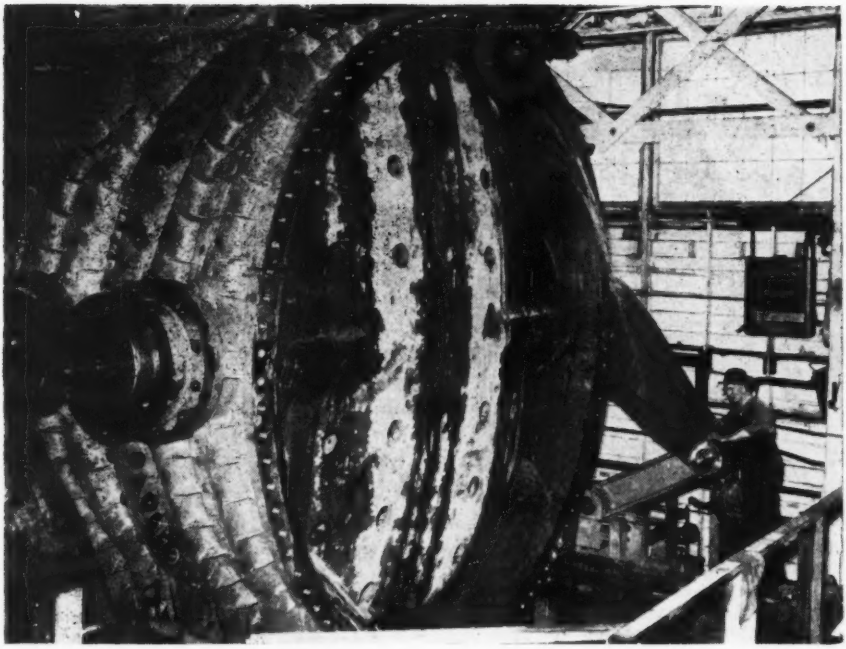

Fig. 4 "Un-seating" the valve: the valve has been backed up against another similar unit, and both valve discs are in the closed position. Into the sealed chamber so formed, approximately 2,500 gallons of water were pumped under heavy pressure. To pass the test, the valves were required to hold this water, comparable in pressure to what will be in the tunnel behind the valves, within certain very strict maximum leakage limits. Next, the disc on the right-hand valve was slowly opened by a hydraulic piston. This picture, which shows water spurting out in a fine spray, was taken at the moment when the valve was "un-seated" by a small turn of the disc. The holes in the disc on the downstream face are the result of using core supports. The leaf is not solid but is internally ribbed.

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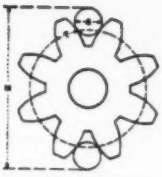

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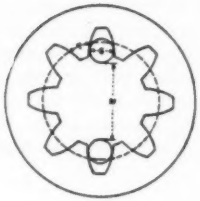

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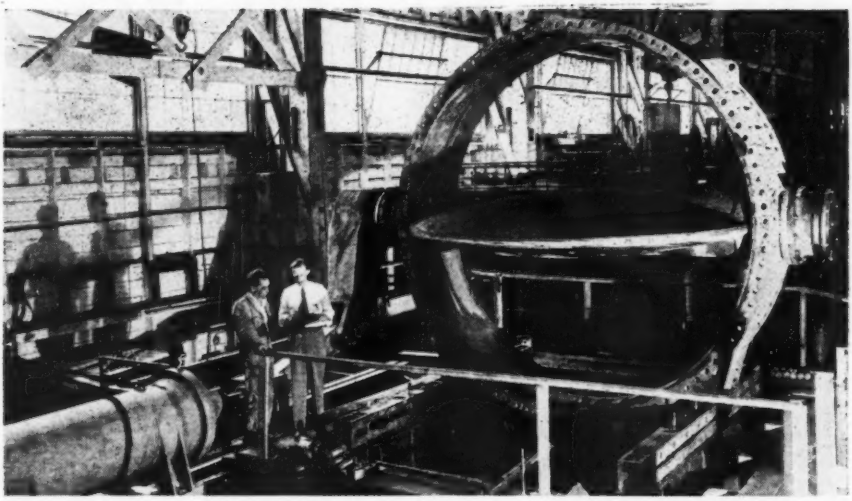

Fig. 5. Apparatus which turns the disc is shown in this view of the butterfly valve with its disc in the open position. To provide clearance for the turning of the disc, the other butterfly valve unit—used in a test shown in Figure 4—has been removed. Two technicians are checking data on the performance of the valve.

• • •

To release the water through the penstock, the disc is turned by a lever arm actuated by a hydraulic piston. When the leaf is first turned, in an action known as "un-seating" which breaks the disc off its seat, the turning thrust must contend with both the friction load between the bronze seats and the water load. As the opening continues, however, hydrodynamic forces must be kept in check by the operating mechanism.

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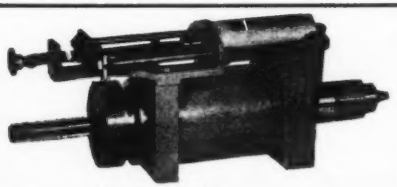

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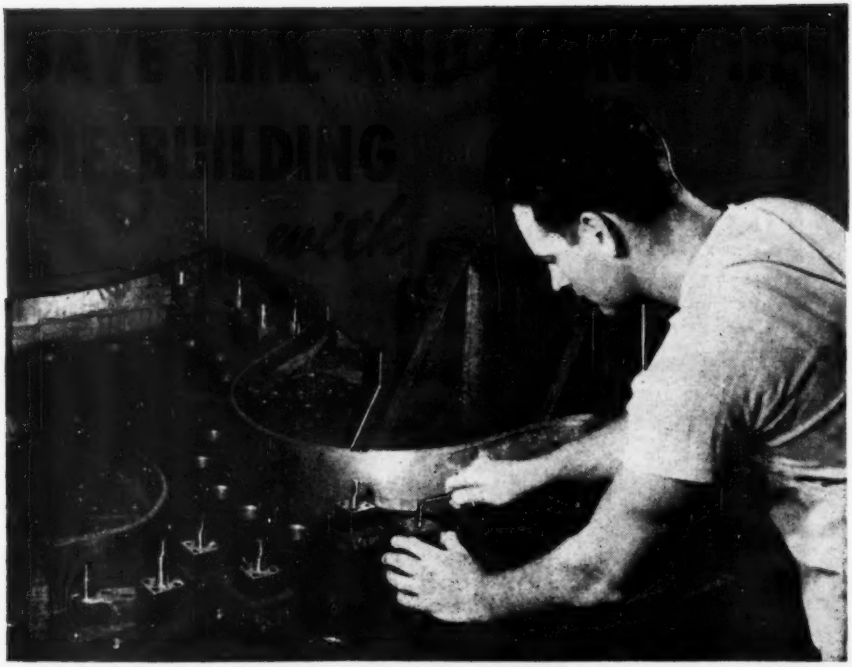

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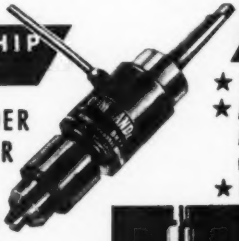

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The right **FILE** *cuts filing costs*

BY STANLEY LIVINGSTON, JR.
RESEARCH ENGINEER, NICHOLSON FILE CO.

Because the major cost in filing operations is labor, it is essential that the right file for the right job be used. Some basic considerations on the types of files available today are presented by the author.

In order to provide a file for every purpose, the file manufacturer makes literally thousands of different types, each type having characteristics that make it better suited for a particular job. At first thought this would seem to make the choosing of the proper file for a given job very complicated. However, it is actually quite simple if the basic factors which control the file's performance are known and analyzed in relation to the application.

File Efficiency

Before discussing these basic factors, the importance of file efficiency should be investigated. Figure 1 graphically shows the results of a controlled test where one filer used two files on stainless steel. One file was a stock file and the other was the same in all respects except for the tooth design. Although of the same coarseness, the tooth structure of the special file was designed for use on stainless steel.

The curves of the graph show two things. First, the special file starts to cut slightly faster than the stock file, and, secondly, it maintains the cutting rate better. The importance of this is magnified when it is realized that the largest portion of total file costs is the cost of the labor to use the file, and this cost increases directly with the file's loss in cutting rate due to dulling. The most efficient file for any application therefore is very important to the file user.

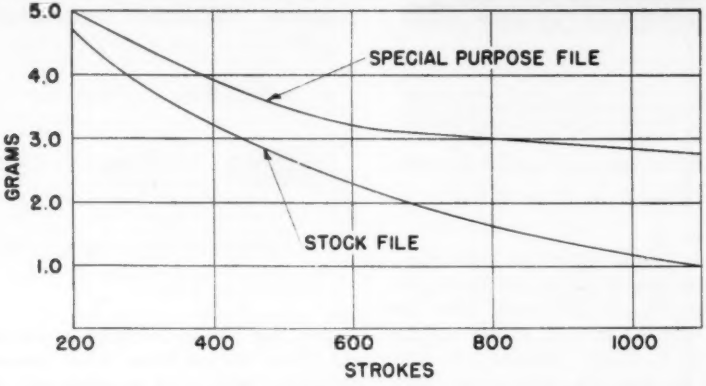
Characteristics That Affect Performance

In the foregoing example one of the characteristics that affects performance was described. There are others, but they can generally be classified under four headings, namely: length, shape, size of cross section, and character and coarseness of the tooth construction.

Length

The length of a file is the distance between the heel and the point, or the working part of the file. Figure 2 shows that the tang is not included in the length. The choice of length is usually made after consideration of the application. In a saw filing machine, for instance, the length of the machine stroke plus the necessary end of stroke clearance would actually determine the file length. In hand filing where the length of stroke is not limited, the choice should allow for long sweeping strokes that do a maximum amount of work per

FIGURE 1- RATE OF STOCK REMOVAL 12" FLAT BASTARD FILES ON STAINLESS STEEL



stroke and utilize most of the file teeth. Since file prices vary directly with length, it is best to use that file on which approximately ninety percent of the teeth are used in a normal filing stroke.

Shape

Files are made in many shapes including the basic types, such as round, square, half-round, rectangular and triangular. There are also many variations of the basic shapes to meet the requirements of specific applications. For instance, Half rounds have a cross section of approximately one third of a circle while the Pitsaw shape is one half a circle and the Cabinet shape is one fifth of a circle. Figure 3 shows the more common shapes in the American Pattern line of files while figure 4 shows typical Swiss Pattern cross sections. There are more types in the latter group because many of these delicately formed shapes are used in fine, precision work such as tool and die making or jewelry manufacturing. The name of the file usually refers to the shape of the cross section, but in some instances it is derived from the job it is made for. For instance, a Square file has a square cross section, and a Mill file is so called because it was originally used to file mill saws. The choice of shape is obviously controlled by the desired contour of the piece being filed.

Size

In most instances the size of the cross section increases proportionately with the length of the file. For example a 10" Round has a larger diameter than an 8" Round. There are some types of files that have different cross-sectional sizes in the same length. A good example of this is the triangular saw files where different sizes are needed to meet the saw filer's requirements for sharpening saws of varying coarseness. The grading of these cross sections from smallest to largest is Double Extra Slim Taper, Extra Slim Taper, Slim Taper, Taper Regular, and Taper Heavy. Most files decrease in cross section towards the point and the general rule is parallel for two thirds of the length and taper (not to be confused with the Taper Saw File) for one third. Many types are made in parallel section throughout the length and these are called "Blunt". The choice of the size of cross section is usually dependent on the size of the area to be filed although, as noted above, in most cases it is inter-related with the desired length.

Fig. 2. Length is measured exclusive of tang

• • •

File Teeth

The most important single characteristic in choosing a file is the character and coarseness of the teeth. The file teeth provide the cutting ability and as such have a direct bearing on the efficiency on any one application. Files are made in varying coarsenesses of cut which range from those which produce a fine finish to those that give rapid stock removal. Generally speaking, finish and stock removal are inversely proportional.

The four types of cut usually found

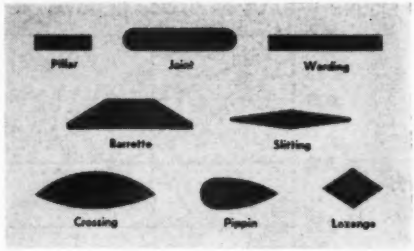


Fig. 3. Typical shapes American Pattern Files

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on files are shown in figure 5. On single cut files, a hardened and tempered chisel is driven at a relatively high velocity into a soft piece of file steel. This displaces the file steel pushing a sharp cutting edge above the original plane of the blank. On double cut files one cut is superimposed over the other. This in effect breaks the long sharp edge of the single cut file into a series

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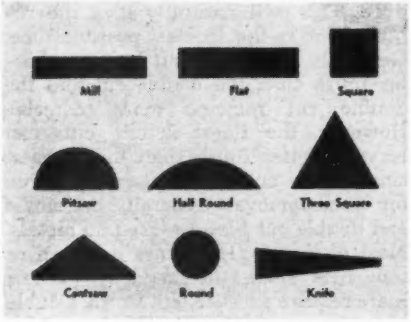

Fig. 4. Typical shapes Swiss Pattern Files

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of sharp points, known as scallops. On a Rasp, each tooth is raised individually by a punch which results in pronounced points on the surface of the blank. On a Milled Tooth file a form cutter mills away the steel leaving a long sharp cutting edge at the top.

In all four types of cutting the characteristics of the cutting edges must be closely controlled for efficient performance. The face angle, clearance angle, gullet angle, and shape of scallop are the more important factors. The file manufacturer controls these to give the customer what is required for the application for which the file was designed. For general work a standard structure is used but on Special Purpose files, such as files for stainless steel, aluminum, and brass, a special tooth structure is employed.

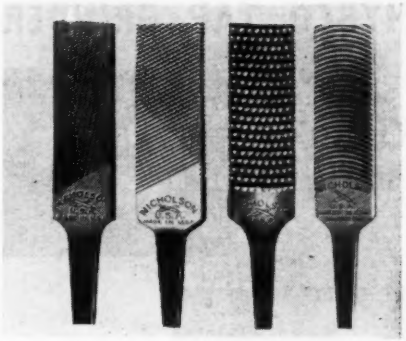

Fig. 5. Single cut, double cut, rasp cut, curved tooth (Reading left to right.)

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Each of the four types of cut is supplied in varying coarsenesses. The file manufacturer's catalogue illustrates the various cuts, and is helpful in making a selection. It should be noted that the coarseness of cut varies with the length. Therefore a 12" Flat Bastard will have a coarser tooth construction than a 10" Flat Bastard. In the American Pattern and Rasp lines the cuts are graded Bastard, Second Cut, and Smooth. In the Swiss Pattern line there is a greater selection, and from the coarsest to the smoothest they are: 00, 0, 1, 2, 3, 4 and 6. The Milled Tooth line is graded, Standard, Fine, and Smooth.

A good general rule to follow in choosing the type of cut required is to obtain the coarsest possible consistent with the finish it is necessary to pro-

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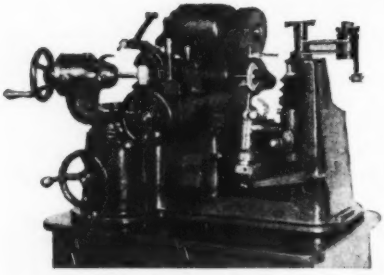

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duce. This will naturally give the required job in the shortest possible time. Generally the single cut leaves a better finish than the double cut and the double cut removes more material. However, the finest double cuts can leave a better finish than the coarsest single cuts and the opposite is true for stock removal. Generally the single and double cut files are used on metals. Most of the single cut are designed as saw files since the majority of saw filers require an excellent finish. Double cut files are often classified as Machinists' files since they are widely used in general machine shop metal cutting. The Rasp cut is used mainly on soft materials, particularly on wood and horses' hoofs. The Milled Tooth files are used primarily by the automotive industry where relatively large areas are filed and a very high standard of finish is required on solder and sheet steel. A choice of a file in the Special Purpose line, which includes foundry, lathe, aluminum, die cast, lead, plastic, and stainless steel filing, can best be made after reading the file manufacturer's catalogue. As noted above these types of filing require spe-

"I'll see the next salesman now, Miss Jones."

tial tooth structures and coarsenesses.

While this article has dealt only with the choice of hand files, the file consumer should always consider the possibility of using rotary power files and burs.

Conclusion

In conclusion the individual trying to decide which file to use should remember first that the highest quality file obtainable is the best because the cost of the tool is only a small part of the total filing costs, and a poor cutting tool is reflected in a direct increase in labor costs which invariably overshadows any saving in tool costs. When making the choice of the specific file, analyze the job to be filed. With this in mind the points to consider are length, shape, size, and the tooth construction. Reference to the manufacturer's catalogue will often clarify the problem so that the correct choice will be made. THE END.

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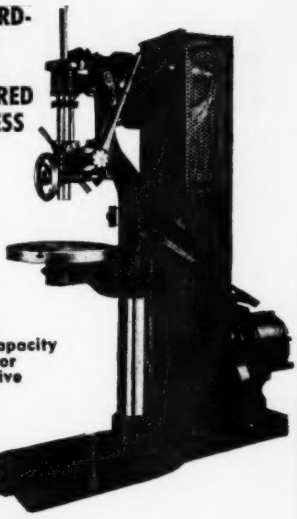

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A New Power Transmitting Device has been developed by Tiltman Langley Laboratories Ltd., Redhill, Surrey, mainly for the transmission of low powers but plans are in hand for 4 h.p. units.

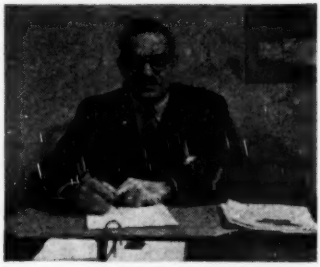
The unit can be employed as a speed reducer and it is claimed to be ideal for high reductions, e.g. 2,000 to 1, for all manner of instrument work. It can be designed as a variable speed gear to give infinitely variable output speeds, within pre-determined limits, from a constant input speed or it can be designed to give a constant output speed when input speeds vary. Reversal of direction of motion can be effected under certain conditions.

A number of hardened steel balls rotate without slip over four hard steel conical surfaces, the balls being preloaded between the cones in order that they may transmit power. Different cones can be chosen as input and output members and by fixing two of the cones relatively to one another different types of rolling motion will be imparted to the balls and consequently differing gears ratio will be afforded. The principle is akin to that of an epicyclic gear, the balls acting similarly to planet wheels.

By axial movement of the cones, e.g. if the outer cones are moved together, the inner cones must move apart in order to maintain the space for the balls, various gear ratios are obtainable.

A two-stage unit has been designed to deliver a constant output speed of 8,000 r.p.m. from an input speed variable from 9,000 to 15,000 r.p.m. and to transmit 4 h.p.

The Recent Motor Exhibition in London has concentrated attention again on the fact that very few of the cars made in Britain are finding their way on to the home market. During the next 12 months the half dozen leading motor car manufacturers in this country are budgetting to spend over £50,000,000 (nearly $150,000,000) on new plant and extensions to works. The aim is to raise their joint production to one million vehicles per year including



Written for the MACHINE and TOOL BLUE BOOK by Robert Hutcheson, editor of MACHINE SHOP MAGAZINE, London, England.

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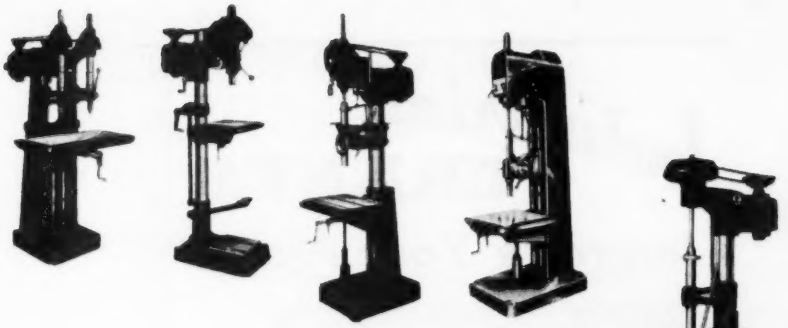
private and commercial vehicles. Of course, even if the extensions are made and the new plant is installed, the success of the venture will depend upon the amount of steel that becomes available to the industry and it is hoped that when the new steel works at Margam in South Wales are in full production by the end of 1951 a much greater allocation of steel will become possible for the automobile industry.

A Serious Mishap has occurred to a nearly finished liner, the "Oronsay" (28,200 tons) which is in the fitting-out basin at the Vickers-Armstrong shipyards in Barrow-in-Furness. The estimated cost of the vessel is £3,500,000 and it is thought that the damage done to it by a fire which broke out in it may amount to the value of £300,000. The water pumped into the vessel caused it to list to an angle of 22 degrees and it was necessary to cut holes in the hull to get rid of the water that had been pumped in to quell the fire.



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British Shipbuilding concerns have complained that although they may have work in hand new orders are going to Continental shipbuilding yards, due mainly to prevailing high prices and especially the high cost of labour in British shipyards. However, the order mentioned above has been secured and the Burntisland Shipbuilding Company have also obtained orders to the value of £1,000,000.

Trade Unions Team. A short while back our trade unions sent a team to the United States to investigate the organisation and methods of working of American trade unions. In many respects their reports sounded rather strange to those who have been so

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long accustomed to the British trade unions' love for restricting output. It is only recently that our trade unions have begun to call for increased productivity and while this is being done at high levels it is not always carried out at lower levels. Recently we have seen a welder in Birmingham fined £2 ($5.50) because over a period of eight weeks he earned 32s. ($4.50). The welder's father, who himself was a welder in the same firm, challenged this action, which he regards as a restrictive practice, and hoped to take the case to the High Court.

The Wage Increases wanted by the unions in the engineering industry are still causing a considerable amount of heart burning. The Employers Federation have made an offer which steps up the wages of both skilled and unskilled workers. Those unions which cater for the unskilled workers are prepared to accept the offer, but the craft unions, looking after the skilled workers, differ. Their objection is that

the increase does not give a sufficiently great difference between the earnings of skilled and unskilled workers in the industry. The leading craft union is the Amalgamated Engineering Union which has 800,000 members out of the 2,000,000 employees who would be affected and they are definitely against acceptance of the offer. The A.E.U. are wanting £1 ($2.8) a week increase but their President, Mr. Jack Tanner, has been speaking bluntly and in a way other members of the A.E.U. do not like, and has been saying that it is extremely unlikely that the full £1 a week will be granted. It is nearly eighteen months ago since the demand for the extra £1 per week was made and that was done very much against Mr. Tanner's advice. The demand will go before the National Arbitration Tribunal in due course and then it remains to be seen what will happen in the industry.

Anglo-American Council on Productivity. One of the teams that visited your country under the jurisdiction of the Anglo-American Council on Productivity investigated simplification and standardisation in American industry. Since then they have issued a report on their findings. Since they have been back, however, they have been conducting further enquiries into British industry and some of their findings are interesting. For example, here the makers of cemented carbide tips for lathe and other cutting tools have reduced the number of tip shapes from 260 to 116 and so far the user does not appear to have been suffering from any disadvantage by this piece of rationalisation. The automobile industry, especially that section dealing with components, has also been carrying out a programme of simplification and standardisation. As a result of this the 48 types of dynamos that were being made before the war are being reduced to 3. The number of types of starter is being reduced from 38 to 5, while battery types are being reduced from 18 to 3. Even more surprising is the reduction in the number of types of distributor from 68 to 3 and of headlamp types from 133 to 2. In the bolt and nut industry it is stated that where one type of bolt head and nut is laid down for a given bolt there are three or four types in use in the United States. The roller chain makers have also reduced the number of types of chain. Over a period of years, types of cycle chain have decreased from 40 to 4 and it is estimated that without this simplification roller chains would probably be costing four times their present prices. THE END.

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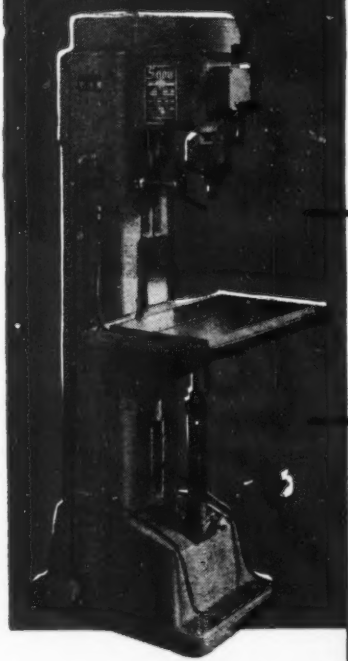

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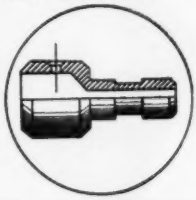
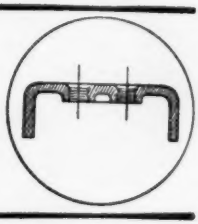


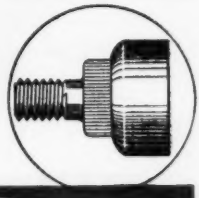
Cressdrill and C'T" Sink 1/16" Hole
Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling Machine

TAPPING



Tap Two #10-32 Holes
Material—Steel stamping
Production—3800 tapped holes per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping machine

THREADING



3/8"—24 Thread—1/2" Long
Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine

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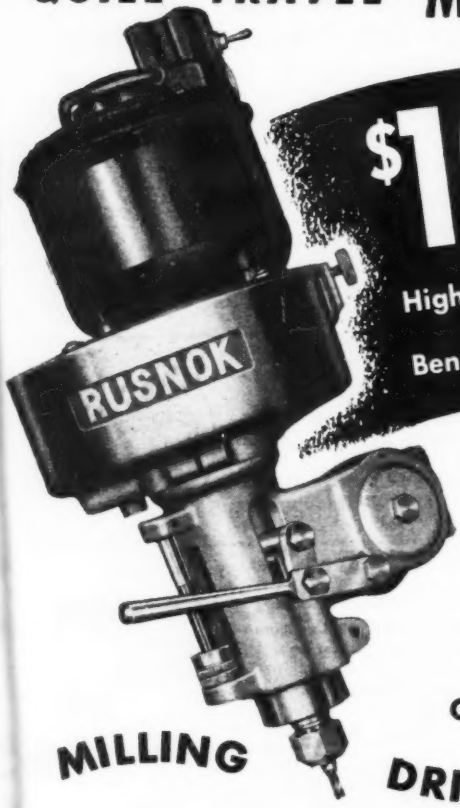

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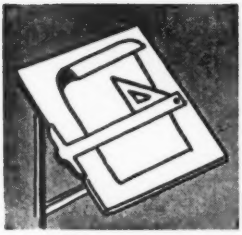


MTBB
JANUARY 1951

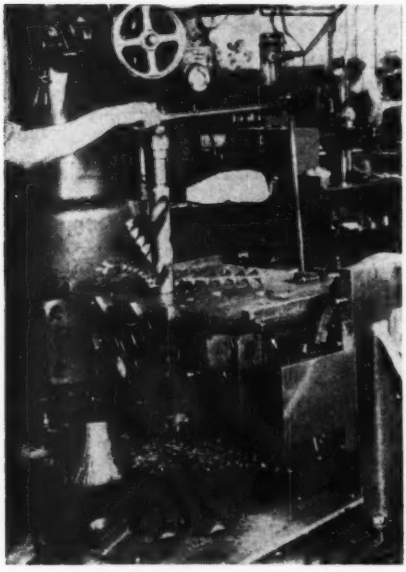
Shop Hints

Adjustable Index Table Eliminates Tedious Machine Work

by G. W. Hilton, Westinghouse Electric Corp.

One of the most important continuing assignments is that of drilling many different types and sizes of holes in various steel plates and housings. These are high volume jobs, which must be done quickly to avoid production delays. As is frequently the case with such work, it was often difficult to keep on schedule until a special application was devised for this operation, using an adjustable index table with a vertical radial drill.

In the past, when the conventional type of horizontal boring mill was employed for this work, there was a great deal of setting-up time for each of the many repeated operations. It was hard to feed coolant to the drill and to load the pieces, many of which were housings that were quite flexible and difficult to clamp into position. Such units have sufficient "give" to make them spring back to a different shape when they are removed from the machine. Therefore, extra pains had to be taken to make sure that bearings on both sides of a housing would be in proper alignment.



In general it was found that, however efficient the conventional horizontal boring mill may be for work to which it is primarily suited, it was too slow and awkward for most of the multiple drilling jobs.

A new application of an adjustable table with a rotary drill press was developed which has made it possible to speed up drilling work by about 60 percent. The operation is basically very simple; the jig containing the piece is placed on the table, which turns on a vertical plane. The drill head can be quickly placed into position for any number of holes desired on the top surface. When the top surface is fin-

• • •

Drilling of multiple holes is greatly simplified by this adaptation of an adjustable index table with a vertical boring mill. The table is pre-indexed and once the set-up is made, any number of subsequent operations can be repeated on both sides of the piece.

ished, the jig, and the piece inside it can be "flopped" in a few seconds with the aid of a hoist.

Once the machine is set up for the work and checked to make sure it is level and accurate, the operator merely has to use the constant locator settings for any number of subsequent operations. Furthermore, duplication is automatic for both sides. Figure 1 shows the use of this method for drilling a plate for a circuit-breaker housing. This piece, incidentally, is one of the "flexible" units which are so difficult to load and clamp on a horizontal boring mill. A completed unit, which has been removed from its jig, is shown resting on the floor in the foreground of the picture.

The drilling of each hole in the unit shown actually embraces several different operations, including drilling, reaming, counter-boring and tapping. The machinist is drilling the final hole on the top side. When that is finished, he turns the work over—or "flops" it—in a few seconds, and continues on the other side. The entire drilling job on the two surfaces takes about 1.8 hours. This table is in use at Westinghouse's Sunnyvale Plant, Cal.

Emergency Repairs on Broken Belts

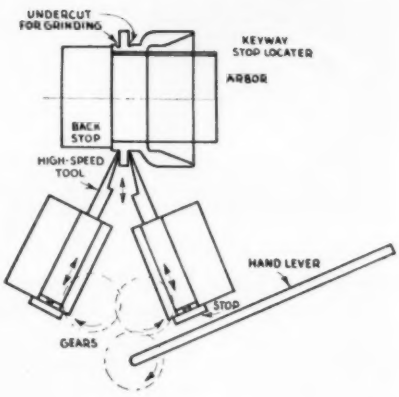
by Roger Isetts

When rawhide belt lacing breaks and there is none immediately available, a fast emergency repair job can be made by utilizing a length of electricians rubber tape. Take a piece about twelve inches long and twist it lengthwise to form a cord about an eighth of an inch in diameter. The tape can then be laced in the conventional manner.

Novel Fixture for Undercut Operations

by George Pheil

Here is a practical tooling fixture for undercut operation. The attached sketch is virtually self-explanatory. It is a sure, safe, fast answer to a detailed operation that is nonetheless important and very applicable to similar machining operations.



The depth of undercut can be controlled and adjusted by the stop, as shown in sketch. Straddle undercutting is performed simultaneously due to the gearing arrangement. A single undercut on some parts is accomplished by simply removing one tool.

The keyway stop locater definitely positions the work piece radially from turning. The hand lever gives ample leverage for fingertip ease of manipulation.

The whole complete fixture is one unit adaptable to any lathe suitable for this type of operation.

Precision Measurement of Small Holes

by Federico Strasser

It is practically impossible to measure the exact diameter of very small holes with the aid of normal measuring instruments. For this purpose I have adopted a very simple method. I use drills, or drill rods, with decreasing diameters by .002" and look for those two drills (with .002" difference between their diameters), from which one enters the hole and the other does not. The size of the hole diameter lies between the sizes of the two known drills, which can otherwise be easily measured with the aid of a micrometer. This method really corresponds to the "go, no-go" gage.

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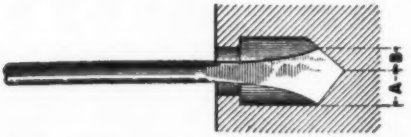
Some Drilling Tricks

If you have no twist drill of a size you need, it is not difficult to make one out of drill rod steel. You can make one in any size in the manner as shown in the sketch herewith. Heat the end red hot and hammer out flat, as pictured. Then cut, grind, harden, and temper. Thus for example if you want to drill a half-inch hole the dimension



A should be one-fourth of an inch. For best performance the dimension B should be equal to A so that the point will be exactly in the middle.

By making B less than A, as shown in the sketch, it is possible to make the bottom of the hole greater in diameter than the top of the hole, as indicated. The diameter of the hole will always be twice the greater radius, which in this instance is A.

As for cutting angles, the best way to get them right is to mimic the best practice. That is, make the cutting angles and edges the same as those you find on your standard drills.

Dividing One Inch Into Unequal Parts

by George F. Burnley

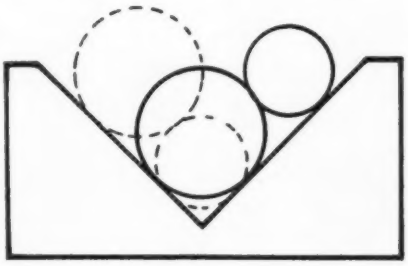
Certain layout jobs require the divisions of one inch to be layed out in tenths, twelfths, or even seventeen parts per inch, for instance. As such fractional positions are difficult to locate without special scales not generally carried by the average machinist, the best results may be had by using a tool nearly always available, namely, the common thread pitch gauge. By barely touching the tips of the thread gauge with Prussian Blue the fractional parts of an inch may be readily had in lightly pressing the desired pitch down on a trial scrap of paper marked in one inch divisions. It is, of course, wise to double check on this system when learning to use it, since confusion may result if the base of the thread rather than the tip is used to set the dividers. In this respect, it is well to point out the fact that, for example, a nine pitch thread would have ten points, inclusive, per inch, a sixteen pitch, seventeen, etc.

Again, in reference to thread pitch, another "kink" in getting the pitch of threads not covered by the standard gauge such as metric threads may be handled as follows: Procure a short length of light colored hardwood having, at least, one true, straight edge. On this edge lay off a few one-inch divisions scribing them first then making the mark clearer with a light blow from a sharp chisel. Next, rub the thread in question very lightly with a bit of Prussian Blue. Finally, set the divided side of the piece of wood over the blued thread and give it a smart rap with a hammer. When the block is taken away the threads, of course, will be clearly outlined on the divided "scale."

Centering Shafts On Layout Table

by George F. Burnley

It often happens that a pair of shafts of different diameters must be centered accurately on the layout table. In such cases time can be saved without the sacrifice of precision by setting both shafts, one on top of the other, in a 90 degree "V" block. With the necessary adjustments, the upper shaft is marked with the scriber of a surface gauge and the positions of the pieces reversed. It will be found that the exact center of the unmarked shaft is in the correct position for marking without additional manipulation of the surface gauge.



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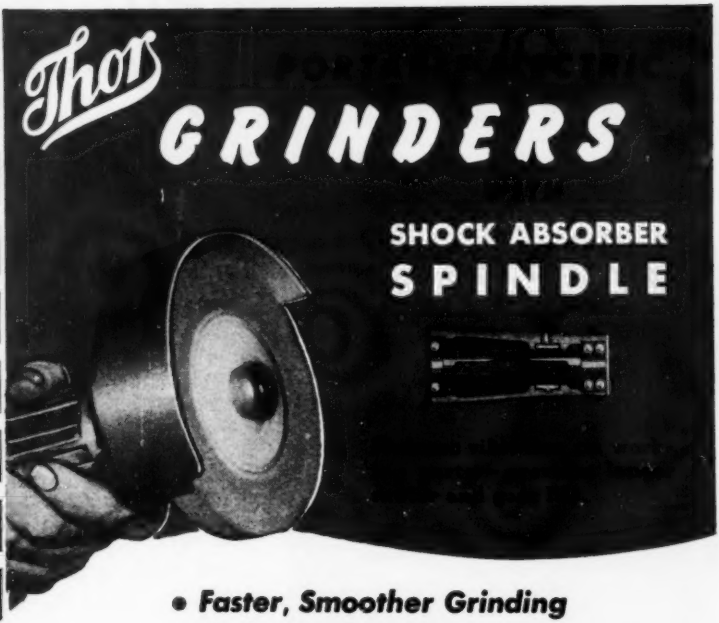

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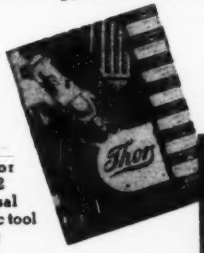

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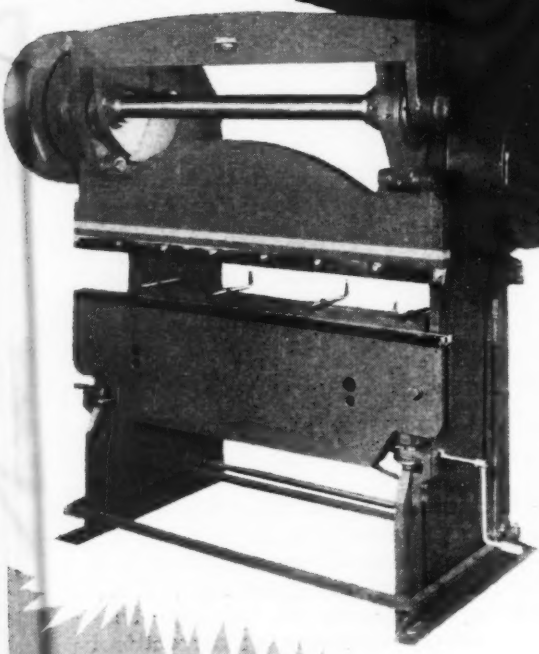

A POWERFUL, rugged, inexpensive Press Brake, designed and built to the standards of Chicago Steel Forming Presses.

Can handle 40 to 50 percent of the work done in the average plant, thereby releasing the larger Presses for heavier work. Can be used for Forming Embossing — Multiple Punching, Notching, Blanking, etc.

World's largest manufacturer of Steel Hand Bending, Power Bending and Power Press Brakes.

A dependable variable speed drive much desired by all users is standard.

A Press Brake made to exacting standards and built to take hard and continuous use.

This press will do your work well and efficiently.

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Variable speed drive for speed and safety.

This is only one of the many fine presses made under the banner CHICAGO. There is a CHICAGO Steel Press Brake to meet your requirements.

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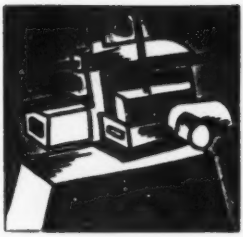


MTBB
JANUARY 1951

Modern Tools in Action

Super-Milling Machine For Boeing Aircraft

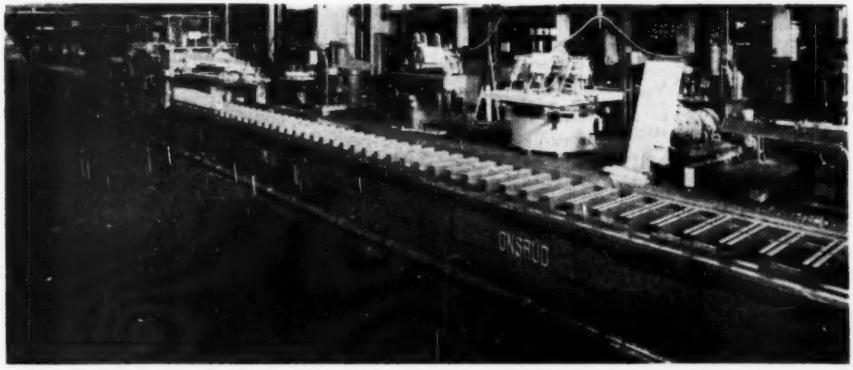
A special production machine is the new Onsrud Spar Mill, recently installed in Boeing Airplane Company's Seattle plant. With an over-all length of 105 feet, this is believed to be the longest milling machine ever built. It will be used to production-machine a variety of Boeing parts.

Airplane spars are tough aluminum extrusions usually 24 ST or 75 ST alloy. The spars require many different types of milling operations such as tapering cuts in the webs and flanges and twist cuts along the length of the spar. The Spar Mill permits milling the entire length of such a part and the making of any type of milling cut required during one pass of the carriage. In addition, since the positions of the cutterheads are controlled by the pattern or template method, milling cuts may be made involving non-mathematical curves as required by design, typical of many of the parts that must be made in aircraft production.

The carriage of the milling machine houses four cutter motors with a total of 200 HP available. Two of these motors are in a horizontal position and two are in a vertical position. The carriage travels over the milling machine bed, from one end to the other, driven by a DC motor and spiral tooth rack assembly under electronic control. Speed of carriage travel is infinitely variable from 10 to 200 inches per minute . . . and may be set to vary automatically in correct relation to the work being milled.

• • •

The bed of the Spar Mill, 90 feet, is so long that it's difficult to show the entire machine in the illustration. Carriage is in approximate center position with short sample work set-up on the bed.



Reynolds AUTOMATIC HOPPER FEEDS

Eliminate costly handling operations by delivering part automatically to work position. Parts poured into the motorized hopper are arranged and fed as required.

Several types available suitable for feeding a wide variety of parts.

Send sample of part to be fed when writing for quotation.

COOK & CHICK CO.
640 S. MILLER ST. CHICAGO 7, ILL.

GEORGE L. *Detterbeck Quality Tools*
SPEED UP
Screw Machine Production

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Inasmuch as we manufacture cams and tools for the trade we obviously do so on a production basis. As a result we offer:

1. Superior type tools . . . at low cost.
2. Practical design based upon many years of experience.
3. Correct specifications which insures maximum service.

Your tool requirements in our hands is your guarantee of better tools at a great saving.

SERVICE

Let us quote on your tool requirements. You'll save money . . . even as compared with "home made" tools. Standard circular form tools for B&S and Davenport Machines carried in stock. Immediate delivery.

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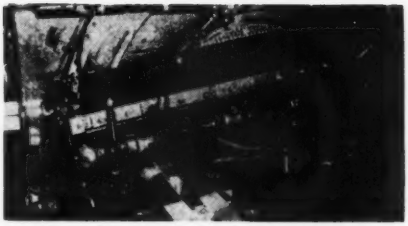
ENGINEERS TO AN INDUSTRY



Close-up of the horizontal motor. It is in tilted position to mill bevel on work. As the carriage travels forward the angle of tilt for the cutter motor changes to produce a varying bevel, or twist cut on the work.

• • •

Many of the types of cuts that can be made on the Spar Mill are possible only because of the design of the cutter motor mounting assemblies. The vertical motors are mounted on parallel arms and can slide up and down and can also be tilted to various angles. Each motor can be guided for position separately under template control as the carriage moves forward in feed. As determined by the template, the motor raises or lowers or tilts, to mill the particular face desired on the work at any given point throughout the length of the part.

Similarly, the horizontal motors raise and lower and tilt, to assume new cutting positions for the cutters as the carriage travels along the bed.

The cutters are carbide tipped. Metal is milled and removed at the rate of 2½ to 4 cubic inches per minute per horsepower . . . for a total of up to 800 cubic inches per minute. Cutter motors and cutters are designed to provide a peripheral speed average of 7,500 feet per minute. Coolant is supplied to all cutters, and is collected in the bed, filtered and recirculated by an 80 GPM centrifugal pump. Machine was built by Onsrud Machine Works, Inc., Chicago, Ill.

Special Machine Drills Six Holes

Simultaneous drilling of six holes in Army-Navy Aeronautical Std. Hex. Head Bolts is being done on the special machine shown, which is equipped

More people are finding out every day that the "Herzberg Way" to production is both economical and efficient. By featuring a complete program from small arm or cluster plate universal type drill heads to large heads and complete drilling fixtures, the Herzberg corporation is ready and more than qualified to help you attain the production you seek.

Why not write for our folders and see how the Herzberg Corporation can help solve your production problems with economy and efficiency.

We would like to thank you for your patronage during the past year and extend our greetings of the season . . . Jack Herzberg

HERZBERG MACHINE TOOLS

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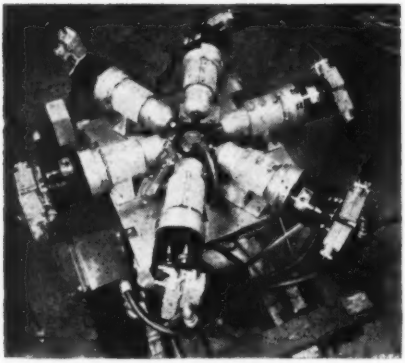

Special drilling units drill six holes in standard hex. head bolts. Machine is adaptable to a great variety of simultaneous drilling operations.

• • •

with six automatic drill units. The bolt, which is made of Nickel Steel and has a Rockwell hardness of 24C, is loaded manually and held by an air clamp. The operator then pushes the "start" button and all holes are drilled automatically. All movements of the machines are electrically interlocked. Coolant is supplied by a built in tank and pump. The central part holding fixture has easily removable bushings to accommodate all sizes of hex heads from 3/8" to 1 1/8".

The drill units, which have automatic forward and reverse movement of the drill spindle, operate in a constant bath of oil. They are manufactured in progressive sizes with drill capacities from 1/16" to 3/8" dia. Drill units were made by Simplex Tool Eng. Co., Detroit 1, Mich.

Thread Rolling Reduces Costs 50%

The Eddystone Division Shops of The Baldwin Locomotive Works recently installed a Cylindrical Die Thread Roller for rolling Class 5 threads up to 1 5/8" diameter on cylinder head studs and connecting rod bolts used in their Diesel Locomotive Engines.

Manufacturing savings with the

CARBOLOY TIPPED SCRAPER BLADES

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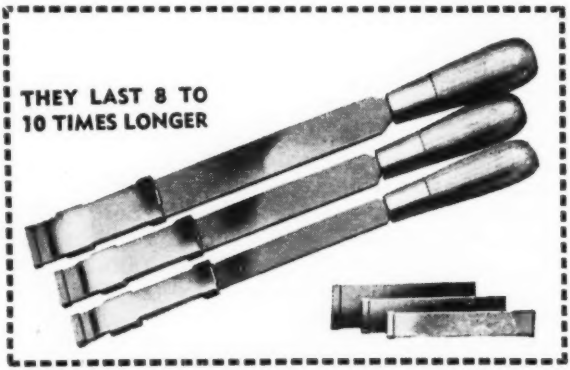
Available in three widths



Especially good for hard alloy iron and extremely hard bronze castings. If you are using Anderson Hand Scrapers it is not necessary to buy complete new scrapers in order to use carboloy tipped blades. Simply remove high-speed blade and slip in the Anderson Carboloy Tipped Blade.

ROCKFORD Anderson BROS. MFG. CO. ILLINOIS

Write for Bulletin No. 12-5

ANDERSON BROS. MFG. CO., Rockford, Ill.

Balancing Ways, Roto Checkers, Hand and Power Scrapers, Spotters, Hand and Power Hydraulic Straightening Presses.

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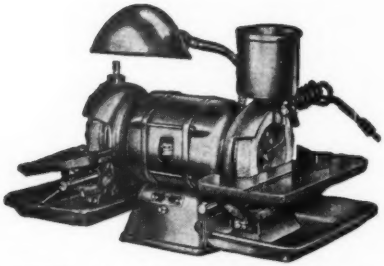
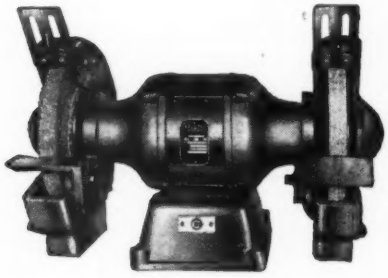


ABOVE: No. 500, Carbide Tool Grinder; sturdy ½ h.p. REVERSIBLE, ball-bearing motor; 6" Silicon Carbide wheels; adjustable tool rests and completely equipped as shown **$131.40**

BELOW: No. 1010, 1 h.p. ballbearing motor, 10" wheels (36 and 60 grit). Wide clearance between motor frame and wheels allows grinding large or odd-shaped pieces **$110.00**



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The grinders are built to give years of heavy-duty service; motors have ample power for normal use plus reserve power to withstand temporary overloads.

Each Baldor Grinder has ball-bearing motor, with dynamically balanced armature for smooth, vibrationless operation and precision grinding.

Wheels are first grade, especially selected for balance; in addition, each wheel is individually re-balanced at our plant and equipped with Baldor Patented Balancing Flanges if necessary to assure perfect balance.

COMPLETE LINE: 6" to 12" wheels; bench and pedestal types—ALL FULLY GUARANTEED.

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as a reminder to send for BALDOR Grinder Catalog pages.

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Illustrated:

The DERBYSHIRE ELECT lathe with 18' bed; ball-bearing headstock with collet closer attachment; double compound rack-and-pinion slide rest with front tool post slide graduated to swivel 360°; six-position turret to take standard tools

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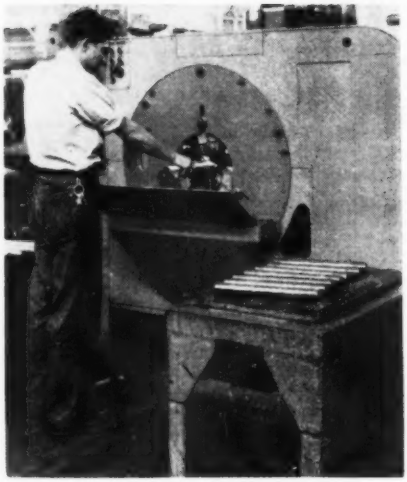

Rolling threads on cylinder head studs and connecting rod bolts used in diesel locomotive engines.

• • •

Thread Roller have amounted to over 50% of the total cost of the bolts and studs, thus enabling the machine to pay for itself in two months. These savings have been made possible, on the studs, by the rolling of the threads, using ground bar stock of diameters smaller than previously used, and eliminating the undercutting of the portion of the stud between the threads. Connecting rod bolts were redesigned for rolling with costs reduced as much as 67%. Machine is a Reed A32, made by Reed Rolled Thread Die Co., Worcester, Mass.

Special Tool Head Triples Production

The idea of using only one tool head for mounting all tools to perform nine roughing operations simultaneously on its cast aluminum converter pump for the Ultramatic Drive has helped Packard Motor Car Co. to actually triple output per machine per hour on these operations.

Former method was by machining with individually-fed tools on a hand

CUT DIAMOND AND GRINDING COSTS 50% ON CINCINNATI CENTERLESS GRINDERS

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Cincinnati Centerless Grinder showing Citco Hydraulic Diamond Turner installation.

If you have one or a battery of Centerless Grinders, you owe it to yourself to check the following points against your present operation —then figure it for yourself, how CITCO saves you money! ● Maintains sharp diamond and fast cutting wheel at all times ● Necessitates dressing 60% less often—consequently more pieces per dress ● Longer diamond life, longer wheel life ● Holds positive form, size and straightness ● No shifting of cam ● Diamond is always on center. The Citco Diamond Turner is precision built and made to last the life of the machine of which it becomes a rigid and permanent member. All moving parts sealed in oil.

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Manufacturers of Citco Solid Copper Diamond Tools . . . They're cool.

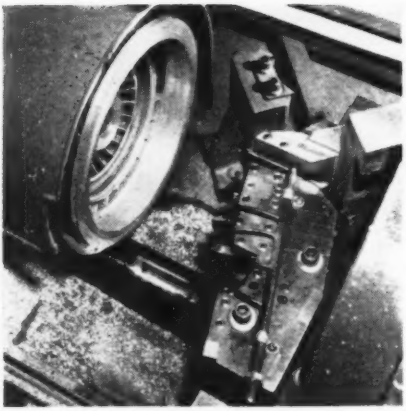


Fig. 1. This single tool head in this Gisholt No. 12 high production lathe, designed so that the carbide tools in it perform nine roughing cuts simultaneously on the cast aluminum converter pump for its Ultramatic Drive, has helped Packard Motor Car Co. to triple output per machine per hour on this operation.

• • •

screw machine. With the new tooling, figure 1, employing modified standard carbide tools in a Gisholt No. 12 high production lathe, about one pound of metal is removed in 30 seconds. Cutting speeds on the aluminum casting range as high as 3400 SFPM, spindle speed being 800 rpm. The O.D. of the pump is 13½", figure 2.

The operation consists of 9 cuts: 3 facing, 1 boring, 3 combined boring and facing cuts, and 2 combination facing and chamfering cuts. Total feed is .012" per revolution.

Seven of the nine tools used are Carboloy standard styles (Grade 883) slightly modified so as to have a 10° front rake and a 12° side rake, figure 3. Use of the seven standard style tools reduces tool cost and also tool inventory requirements. One complete set of sharpened tools is kept in the tool room and one sharpened set is in readiness at the machine, while the third set is in use. Three of the tools are changed after machining around 200 pieces, the change requiring less than 20 minutes.

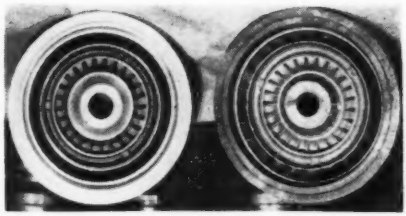


Fig. 2. Sand cast aluminum converter pump for Packard's Ultramatic Drive, before and after nine roughing cuts, facing, boring, and chamfering, have been taken simultaneously on a high production lathe tooled with modified standard carbide tools. An average production of about 45 pieces per hour is currently maintained.

• • •

The other six require sharpening after 2000 pieces.

Other equipment on the machine assisting in achieving the high out-put per hour (60 units per hour easily obtainable; current rate averages 45 pieces per hour), includes a vacuum operated work holding chuck for quick, easy loading.

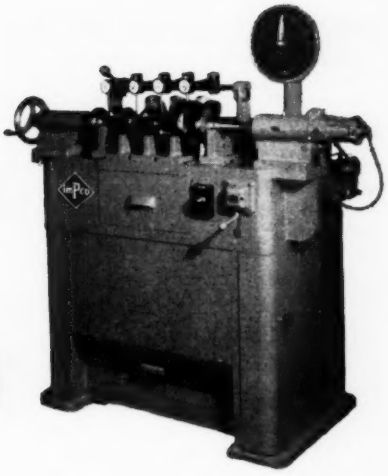
No trouble is experienced, apparently, from "built-up" edge on the tools—a common experience when machining aluminum. Contributing factors may be the high cutting speed, and the use of a vaporized film of cutting oil directed by air pressure onto the carbide tips through a series of small pipes.

Even at the high rate of stock removal, the work does not heat up. All the heat is concentrated in the chips, leaving the work and tools cool.

• • •

Fig. 3. Seven of the nine tools used are Carboloy standards, slightly modified for simultaneously performing rough facing, boring, and chamfering cuts. Three of the tools are removed and sharpened after machining about 200 pieces. The rest require sharpening after 2000 pieces.

The New IMPCO CRANKSHAFT STRAIGHTENER



This machine handles the straightening operation on crankshafts on a high production basis. Straightening is accomplished by pulling downward with hooks which are positioned laterally to line up over the intermediate main journals of the crankshaft. Hooks are actuated by an eccentric shaft below the work surface. Stationary "Vee" anvils are furnished under front and rear journals. Centers are spring loaded and air operation is used for quick loading.

To operate, the crankshaft is laid in the stationary anvils and the centers engaged by hand valve. The indicators are lowered against a stop and the crank is rotated to the point of greatest runout. Indicators are raised to clear, and the hook is then drawn forward over the point of greatest runout. By pressing the "Run" button the hook pulls downward until the button is released. A large dial indicates the amount of deflection being applied to the part.

This method of straightening is as superior to conventional methods in the matter of increased production, as is the use of a multiple spindle drill head compared to the single spindle method. For example, the industry average for straightening a five bearing crankshaft is twenty-two parts per hour. The "Impco" has increased production on such an operation to forty parts per hour.

Construction features of this machine include the use of steel weldments for all structural members, easy accessibility to the moving parts by means of hinged guards and lift-off panels, the generous use of Ampco Bronze for bushings, heat-treated alloy steel gears, and a "one-shot" lubrication system.

The machine is extremely easy to keep clean. Maintenance is negligible as there are no hydraulics, screw threads, or clutches to require attention.

Besides the savings in direct labor on the straightening operation, the machine saves considerable floor space. Because the parts can be straightened to closer tolerances, some manufacturers are making additional savings on grinding operations. Grind allowances can be held to an absolute minimum, thus giving more grinds per wheel dressing.

Your inquiry on how the "Impco" Straightener can answer your particular needs will receive prompt attention.

imPco

INDUSTRIAL METAL PRODUCTS CORP.

P.O. BOX 156 **LANSING 1, MICH.**

Fast Lapping of Relief Valve Parts

The problem was to provide production machine lapping of a steam relief valve part for several companies who formerly lapped these parts by hand. The area to be lapped on the part consists of a circular ring on a plane from which a conical section protruded and could not be lapped by use of the familiar flat lapping machine methods, due to this conical protrusion.

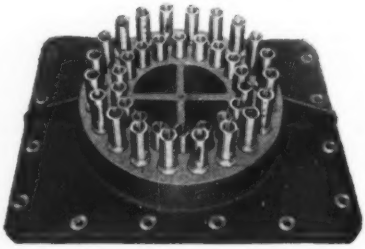
By cutting an annular groove in the lap plate of the Crane Lapmaster machine it was possible to provide a constantly maintained flat lapping area on which this plane of the valve could be revolved by operation of the machine. Substitution of any of three grooved lap plates for the normal lapping plate on the machine enables these manufacturers to process a wide variety of sizes with one machine, as well as do their normal flat lapping production on parts without projecting areas.

With this adaptation of the Lapmaster machine it has become possible to bring these parts to a flatness of one to two

The annular groove in the lapping plate of the lapping machine is shown with several of the relief valve parts.

• • •

light bands and a finish of two to three micro inches RMS, doing a large number of parts in a fraction of the time formerly required to process one part by hand. Use of the machine for this purpose has proven itself valuable in two fields for these manufacturers. The Lapmaster is made by the Crane Packing Co., Chicago, Ill.



Pictured: a 38-Spindle Heavy-Duty Drill Head

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We invite your inquiry.

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Unusual Application Saves Production Time

The problem at Allis-Chalmer, Wisconsin, was one of producing both a back-spot face and a chamfer on the inner boss of a heavy cast housing, as well as a corresponding chamfer at the outer entrance of the same hole. Through the use of special tools the

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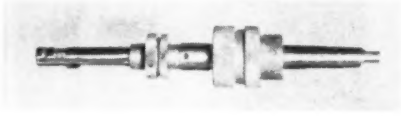
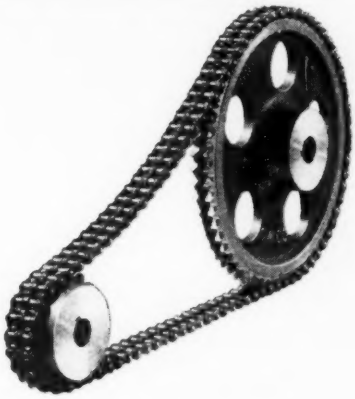
Tool produces both a back-spot face and a chamfer on the inner boss of a heavy cast housing, as well as a corresponding chamfer at the outer entrance of the same hole.





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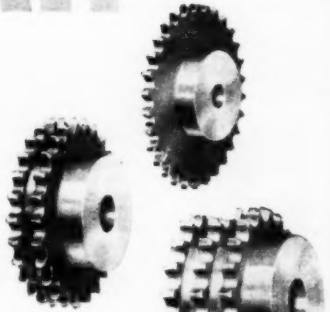

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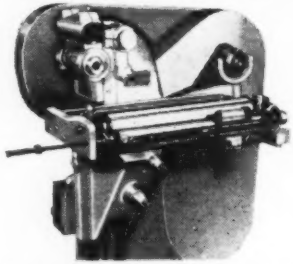

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The number one value in medium size all purpose milling machines. Hand or power feed. Send for information.

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Send us samples of your work completed to the riveting stage. In return we'll supply guaranteed production data and experienced counsel on your fastening problems. No obligation. Write today. It's free.

HIGH SPEED HAMMER CO., INC.

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job is now performed at a considerable saving in production time. The tools in this application act as a pilot for a removable back-spot facing cutter of conventional design and also incorporate a retractable blade for the chamfering operation. Thus, the two operations are accomplished in quick succession without stopping the spindle or changing tools, inasmuch as the chamfering cutter is projected or retracted by movement of the knurled sleeve during the spindle operation. Adjustable stop rings provide for the positioning of the tool. Tools were made by Nobur Mfg. Co., Burbank, Cal.

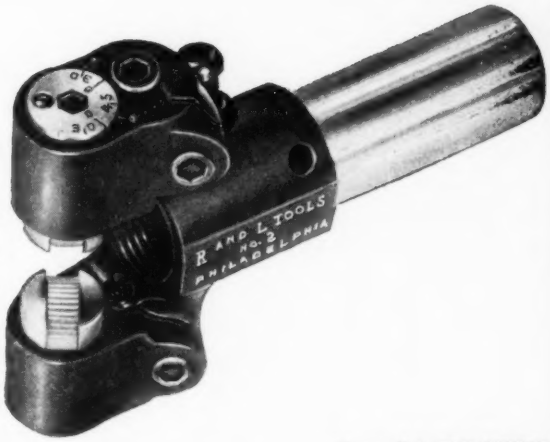
GAGING QUIZ

Answers to quiz on page 80

1. Gaging button
2. Flat plug gage
3. Taper lock plug gage
4. Allowance
5. Base
6. Thread ring gage
7. Locking slot
8. Length of engagement
9. Neutral zone
10. Crest clearance

"I'm sorry gentlemen. It seems that Mr. Jones has left for the afternoon."

R AND L TOOLS



NEW! R and L KNURLING TOOL

New streamlined design has half the weight of existing tools of comparable size, affords better grip and controls of knurls. Available in a complete range of sizes. Only one Hex Wrench needed for all adjustments.

R and L FLOATING DRILL HOLDERS

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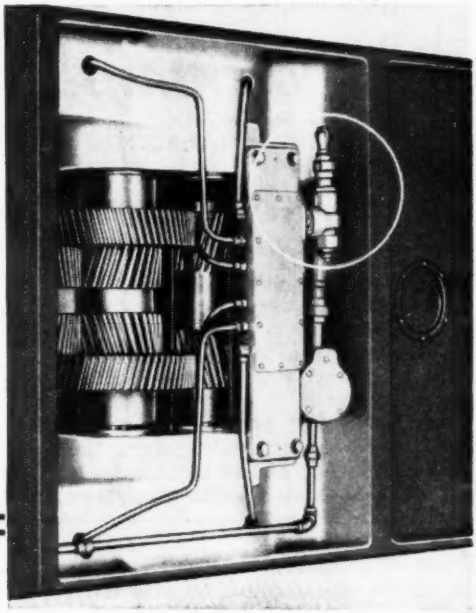

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Foremanship Forum

How To Plan And Develop In-Plant Training Programs, Part I

by Edmund Mottershead

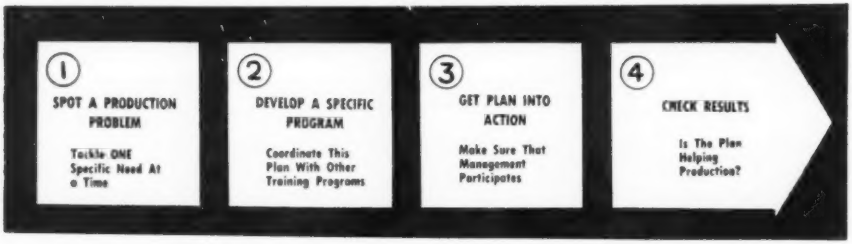
Ray Morin says: "One good way to get a lasting finish on your car is to try to beat the train to the crossing." We might paraphrase that idea and say: "One good way NOT to solve **production** problems is to apply generalized 'training programs' to a supervisory organization without first identifying the specific problems, underlying conditions, and working out a specific plan to fit that particular need."

At the peak of our effort during World War II—1944—we had roughly two-thirds of our entire working force either working in war industry or in the various branches of the armed forces. Today, steel capacity is up one-third over 1939; electric power capacity is up 50 per cent. Our pool of technical know-how is infinitely greater. However, as most industrial managers know too well, production problems do exist, and will continue to exist, and they can be met only by increasing the skill and productivity of available workers—who are far fewer than in 1939.

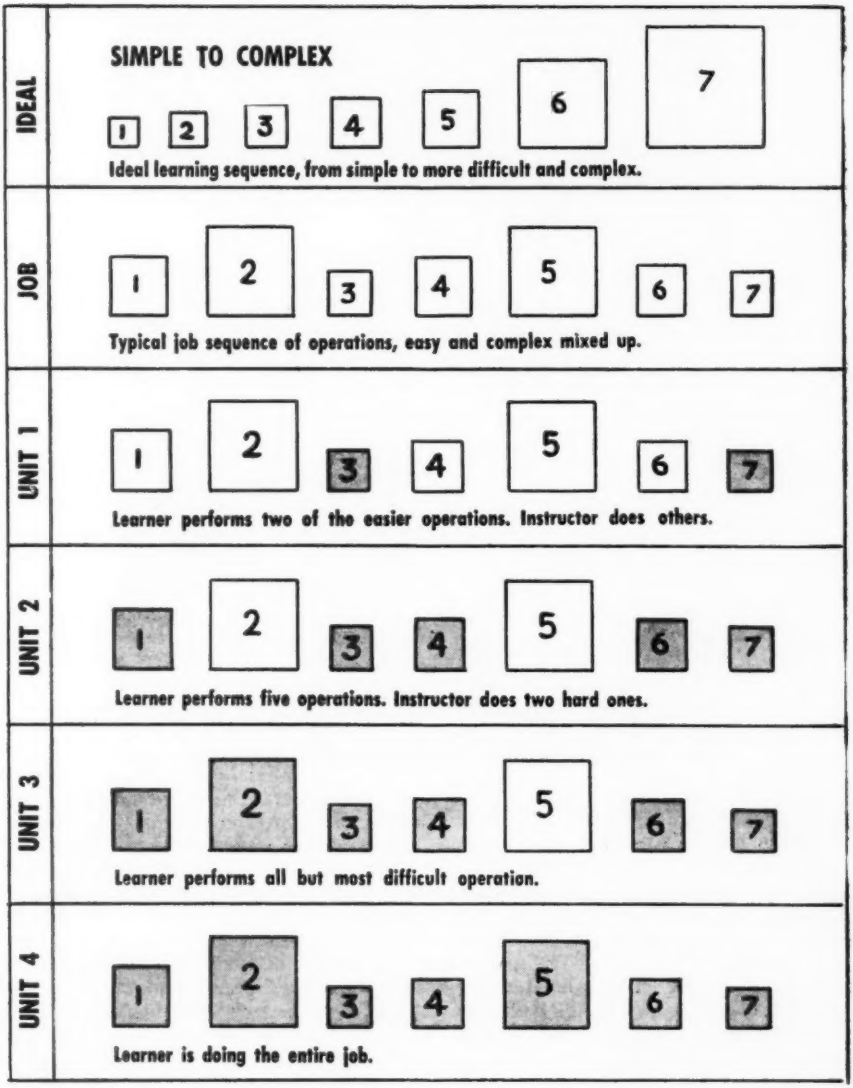
Deskill the Jobs and Upgrade Workers

The present objective is to make unskilled or semi-skilled workers into semi-skilled and skilled machine operators—to make skilled operators into machinists and tool-makers. The man who said: "The solution to the problem lies within the problem" had the right idea for industry today. The answer to the shortage of skilled workers is not to hire more workers, but to train those you already have—for specific production needs.

A typical sequence of upgrading, for example, might occur in a machine shop somewhat as follows: the new worker (unskilled) is put first on a burring operation, then trained and eased into small lathe, from there to



The ideal learning process is from the known to the unknown, from the simple to the more difficult and complex. Most jobs, however, have difficult and complicated and easy operations scattered along the way in sequence different from the learning process. Teach the learner by easy stages, easy phases first, while the old timer continues to perform the more difficult operations, letting learner become familiar gradually.



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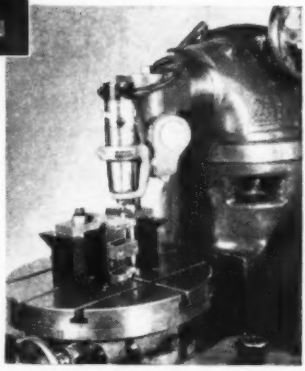

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drill press operator, then onto boring machine, engine lathe, hobber or thread miller, then becomes automatic screw machine operator, then milling machine operator, then turret lathe, then he might become helper to the set-up man, and finally set-up man. The point is that at each stage of skill he is actively productive, and is put on the next higher level as the need for that skill develops in the production flow.

One thing which has happened in the past is that with technological developments, new automatic and semi-automatic machines are introduced into a production department, and then put in the hands of experienced mechanics as operators—when these experienced men might better be upgraded to toolmaker specialists or something of that sort, and the new machine operated by a far less skilled man who still has enough ability to operate the machine.

A training program for tool-and-die

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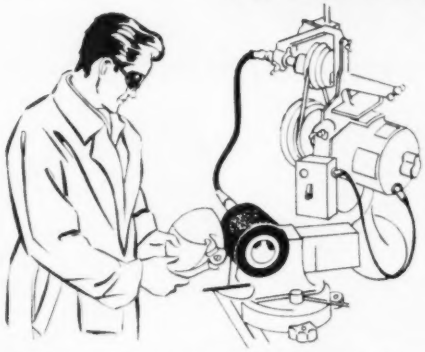

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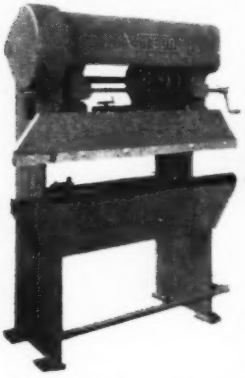
making apprentice, for example, would probably include lathe work, milling machine, grinding, jig and fixture repair and then production, heat treating, punch and die repair, welding, punch and die production—more or less in that order. When completed, such a program has created a man of diverse skills and ability—far too good a man to hold on some production job involving duties required of a man who can only operate a single machine.

If a production process requires two lathe operations—and only two—to be performed on a given piece, there is no particular need for having an operator who can perform all 72 lathe operations. By breaking up "multiple skill" jobs into their components, it is usually possible to make extensive use of unskilled or semi-skilled workers, upgrading the skilled man into a higher key spot.

During the last war, one plant in Rock Island was compelled to close its foundry, employing some 225 men, while work in other departments required the services of over 200 machine operators,

Slash
metal forming costs...



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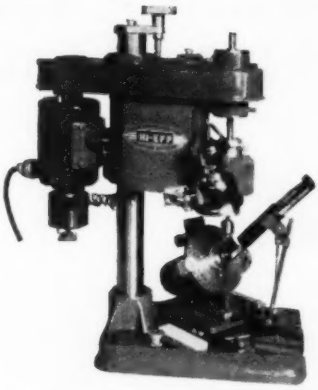
THERE'S A VERSON PRESS BRAKE FOR EVERY JOB FROM 15 TONS UP!

40 machinists, and some 25 tool makers. Every one of these 225 men was "salvaged" for the company by deskilling the machine operations so that they could—within the limits of small experience and limited training—operate the machines. Machine operators became machinist's helpers; machinists were moved up to become tool-maker specialists, and the pressure for "new" help was reduced to 40 or 50 men instead of nearly 300.

The point is that in cases such as these, training became useful when it was integrated into the plant production problems, and when training was recognized as a continuous process which must be carried out on a long-range basis.

Phases of Training

There are various aspects of training which management needs to consider. The first is that management must accept its responsibility for the whole pro-



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cess of building men in the organization. True, management is concerned with production and costs, with results regardless of people or methods or difficulties. But so long as the results must come from people rather than robots, just so long must management build into its people those skills and attitudes, knowledge and work habits, which help the organization solve whatever problems are encountered in getting out the production.

The new employee's introduction to the plant and his workplace the first day has an important bearing upon how well he will turn out. It is well known that the vast bulk of labor turnover occurs in people who have been employed a relatively short time. Like infant mortality, the first 90 days or six months are the difficult days which kill off the worker who is undecided, confused, untrained, disorientated, or neglected. An induction program which

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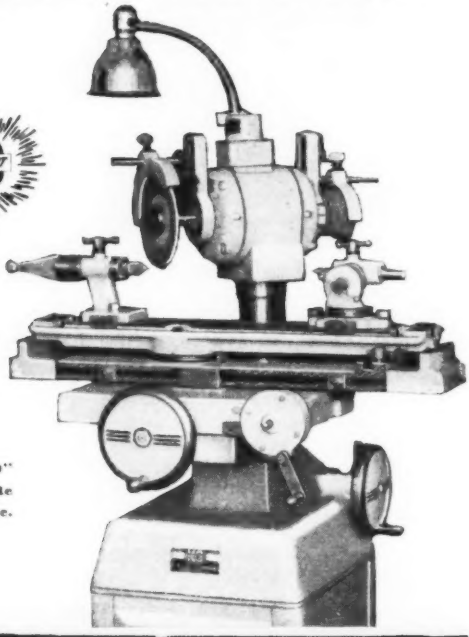

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orients the worker to the plant, to his job, to his associates leads naturally into specific job training.

Specific production job training is as important for the "experienced" worker as for the greenhorn. Many times the "experienced" worker has as much to unlearn as the unskilled man has to learn. Management must consider the standardization of job methods, and the skill of available supervisors and leadmen in putting those methods across.

Supervisory training in job knowledge and in an understanding of duties, authority and responsibility is also a management task. Foremen and leadmen need skill in instructing, skill in improving job methods, skill in handling their men. These are skills which the man must acquire for himself, yet which

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management must assist in by providing him with situations in which he can learn those skills and improve their habitual use.

Management must further consider the relationship of the line and staff organization in the training problem—establish where and how staff departments are to contribute to the development of training and its promulgation, define just how line or operating departments are to carry out specific training tasks and follow through on their execution.

Finally, management must provide ways and means of evaluating the results, see how a specific training operation attacks a specific shop problem and measure its success in removing that problem. If the training effort is to be worth-while, it must pay off either in measurable cost decreases or in demonstrable production increases—allowing for the effect of other factors

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which enter the picture also, such as changes in materials, new methods, new specifications, materials shortages, and a host of other developments which can effect the result of the training program.

Developing a Training Program

Late in the war, Training Within Industry stabilized a device known as "Program Development"—a method by which training directors or those responsible for training in their plants could establish necessary and practical training programs. It involves four main steps:

Spot a Production Problem.
Develop a Specific Plan.
Get the Plan Into Action.
Check Results.

1. **Spot a PRODUCTION Problem.**

Get supervisors and workers to tell about their current problems. Management thinks in terms of production results—talk about and look for specific

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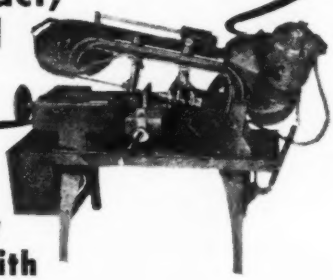
production problems. After listening to comments by workers and supervisors—tapping their thinking as much as possible, review the plant records for costs, production, accidents, turnover, scrap and rework and other factors. Cost figures alone may be much less important than the cost trend which is revealed by studying the records. Try to anticipate any changes which are likely to result from new policies, new production methods, new products, new organizational alignments, and similar factors.

Once this accumulated data is reasonably complete, analyze it to determine the specific production problem needing attention at the present time. Consider underlying causes and conditions which surround the problem. From these conclusions, the next step is to identify the specific training required to assist in solving the problem. Avoid preconceptions which tend to

BIG saw performance in a compact, economical package



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color your thinking. Many times other things must happen toward the solution of a problem before training can be put into effect. Sometimes training must be coordinated with other activities. There is no set rule to follow except that of getting in sufficient information so that the real facts of the particular case will of themselves bring out the necessary solution.

And: tackle one specific thing at a time! This does not mean a piece-meal approach to the over all problems of the organization, but rather it means concentrating your efforts so that something is accomplished rather than scattering your efforts all over the place. It also means that from the standpoint of measuring results, you have kept to a minimum the number of factors influencing the results of the training begun.

2. **Develop a Specific Plan.**

The first logical element in develop-

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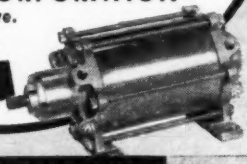

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Bulletin 110 (Left) "HANNIFIN HYDRAULIC CYLINDERS"

Bulletin 210 (Right) "HANNIFIN PNEUMATIC CYLINDERS"

ing your specific plan is to determine who will receive the training. When results come from people, and when people are largely responsible for the specific production problems being dealt with, the determination of who is responsible for the condition and who can take action to correct it is the first item on the agenda. Next comes specific content of the training program-to-be. If workers are to be trained to produce a piece of better quality, and the fault frequently lies with the material they receive to work on, perhaps they need to be trained in pre-inspection techniques. Or if they inspect their own work, perhaps they need training in micrometer reading. Or ten thousand other specific portions of job knowledge. Build the training-content to fit the specific problem.

How can the training be best carried out? What methods should be used? Should there be classes, conferences,

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demonstrations, movies or other visual aids, on-the-job coaching, or what? Should an outside specialist be brought in for some sessions? Should there be related training in specific skills and knowledges at the local vocational school, for example? When should the training be done—during the work day, after hours, following the shifts around the clock? How long a training session—sometimes 2 hours is too long—sometimes good results can be got in 15 minute periods. Where should it be done—in a meeting room, on the job—in a restaurant dining room?

Watch for the relation of this current plan to other current training plans and programs in the organization. Does it involve the same people, create a conflict on time schedules, draw too many people off the job at once, create a division of interest and attention?

3. Get The Plan Into Action.

Sell the plan to management on the

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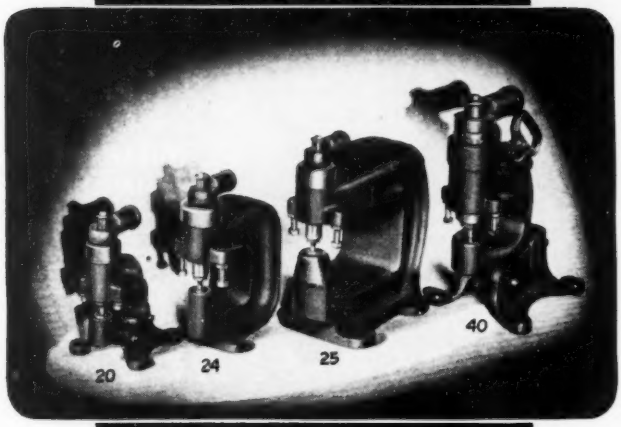
39 YEARS EXPERIENCE



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basis of the production need and the actual facts and figures brought out by your study. Show results that may reasonably be expected, and discuss the proposed plan, its content and the training methods to be used. Don't overlook including a timetable for the training and its expected results.

Consider also how you are going to secure acceptance from all persons involved—from line department heads and foremen—from the workers who may receive the training—from staff departments where cross-relationships exist. Plan some means of fixing responsibility for continued use of the new skills or techniques taught and for follow through on them. Above all, be sure that top management participates actively in the plan, its promotion and conduct, as well as in the follow-through.

4. Check The Results.

When you are building up the program, plan ways and means of measuring results. If a battery of typists in a

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central transcribing department, for example, receive special drill in spelling, it should be a simple matter to measure results in terms of reduced errors per hundred or thousand letters produced. At the same time, some production situations are subject to influence by other factors not within your control, and these should be taken into account and allowed for when setting up standards of measurement of results.

What results does management look for? Less scrap and rework, reduced accidents, reduced turnover, less absenteeism and tardiness, lowered costs, increased quantity or quality of production and similar things. Plan to keep management informed on a week-to-week or other periodic basis while the program is being carried out and also when the program is completed. Watch the plan in action to see what improvements can be made in it while it is still in operation. Plan methods for follow-through and continued use.

At all times keep one thought in

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mind: Is the plan helping production?

Planning Training for the Long Operation

Sometimes an investigation of the facts reveals that neither deskilling the jobs plus specific job training nor upgrading the workers is the entire answer. In some instances the problems of production come up at various stages in a long and complicated operation performed by one worker or group of workers in a department. For reasons of available equipment or space or the nature of the job, it may be impractical to break the operation up into units which can be performed by different people in sequence.

In these instances, when you break down the job for training purposes, break it into several units or "operations"—each of which actually constitute a "job" or task which the worker must learn. The basic principle of learning—proceeding from the simple to the complex, would indicate a most desirable sequence of operations in the

job which were simple at first and increasingly complex as the operations progressed. Unfortunately this is seldom the case, as a job frequently starts with a very complex operation, followed by one or two simpler ones, followed by a more complex one, etc.

The answer to this is to have the new worker—or worker being upgraded—work with a coach or lead-man who is himself performing the job. The first training unit will be one of the simplest operations. When that has been mastered, the experienced operator performs the job, and the learner performs only that one operation. One at a time, the learner takes over the various operations until he has mastered all of them and does the whole job.

Management is interested in one thing—results. As George D. Halsey wrote: "At least half of the average executive's work is teaching in some form, and the higher in the organization he rises, the greater this proportion becomes. And it is an important part of his work because, through teaching, he imparts to others his knowledge, his skills, and his enthusiasm, and thus multiplies many times his power to accomplish results."

End of part 1. Part 2 will appear in the February issue.

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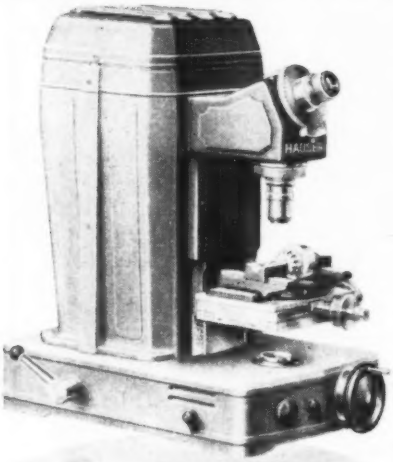

For high precision measuring and the control of profiles on the basis of enlarged drawings.

Instrument is used as work shop microscope or profile measuring machine.

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Thread Measuring: Checking core diameters, pitch, angle of inclination, form of thread.

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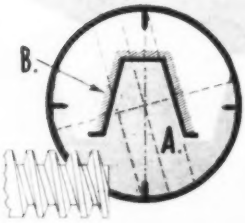

Checking of Contour Line of a Thread Worm, Thread (A) appears green; outline of profile drawing or tracing will appear red (B).

When comparison with contour drawing is not desired, the coloring adjustment is cut out and image in the eyepiece appears in black and white.

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MTBB
JANUARY 1951

Available Literature

1. Ball and Roller Bearings, including various types of thrust bearings, journal and industrial roller bearings, metal balls, etc., are featured in a new 16-page catalog, No. 26. Brief descriptions of the various bearings are given as well as illustrations, drawings showing typical sections, specifications, and prices. **The Gwilliam Co., 360 Furman St., Brooklyn 2, N. Y.**

2. The HyPneuMat, a drilling and tapping unit operated by compressed air or hydraulic powers, offers one stroke or continuous automatic cycling, rotating and reciprocating action. **HyPneuMat, Inc., 647 W. Virginia St., Milwaukee 4, Wis.**

3. Price Lists are available on chucks, vises, cutters, mills, drills, reamers, taps, cylindrical ring, cylindrical plug, thread plug, setting, roll thread, pipe thread and snap gages. **Sid Tool Co., Inc., 126 Lafayette St., New York, N. Y.**

4. B & S End Mills are available with fast spiral angle for fast cutting and a small helix angle for accuracy. A 22-page booklet shows various sizes and styles of end mills together with specifications and prices. Included are spiral end mills, fast spiral single-end end mills, two-flute fast spiral end mills, etc. **Brown & Sharpe Mfg. Co., Providence 1, R. I.**

5. High-Speed Metal Cutting Tools, some of which are arbors, bits, counterbores, shears, taps, gear cutters, etc. are illustrated and briefly described in a recent catalog No. 50 covering 176 pages. **Reltool Corporation, 4540 W. Burnham St., Milwaukee 14, Wis.**

6. Pliers and Adjustable Wrenches are illustrated and discussed in a 19-page catalog, No. 63-D. Utica tools add power to your hands and provide pliers for every need. Complete specifications. **Utica Drop Forge & Tool Corp., Utica 4, N. Y.**

7. Arc-Fit, the tube and pipe notching production tool, performs the process in five seconds leaving no deformation of tube or pipe. Bulletin discusses the operation, joints, sizes and specifications. **Vogel Tool & Die Corp., 2525 Moffat St., Chicago, 47, Ill.**

8. Expanding Mandrels act as internal chucks for holding work on lathes, grinders, milling machines, etc. Bulletin No. 750 describes mandrels, their construction, etc. Price list, dimension tables included. **W. H. Nicholson & Co., 117 Oregon St., Wilkes-Barre, Pa.**

9. Speed-Right machine tools mean the right cutting speed, instantly set and accurately maintained. 16″ and 8″ sensitive drill presses, automatic drilling units, and flexible shaft machines discussed in catalog. **The Electro-Mechano Co., 263 E. Erie St., Milwaukee 2, Wis.**

10. Electro-Magnets remove magnetic intraocular foreign bodies from eye, and recover lost iron or steel tools from well shafts. Pamphlet illustrates and describes these magnets. **Magnetic Specialties Corp., 25 Park Pl., New York 7, N. Y.**

11. The Controlled-Flow Hydropump simplifies your circuit, saves power and reduces heating. It has a vane-type construction featuring a rotating pressure ring and mechanically positive positioned vanes. **Hydropower, Inc., Div. of Carbide Tools Co., Milwaukee 16, Wis.**

12. The Medelton Poweroll, motor drive automatic coil cradle, produces 30% to 40% higher daily production on hand or automatic feeds, and eliminates danger of lifting heavy coils. Construction details, operation, specifications, and prices. **Wm. Halpern & Co., Inc., 53 Park Pl., New York 7, N. Y.**

13. SpaceMaker Electric Truck for handling double-face pallets 2000 lb. capacity, incorporates several features including light weight, short length, and magic maneuvarability. **Lyon-Raymond Corp., 3722 Madison St., Greene, N. Y.**

14. 10″ Vertical and 20″ Horizontal broaching machines illustrated and described in

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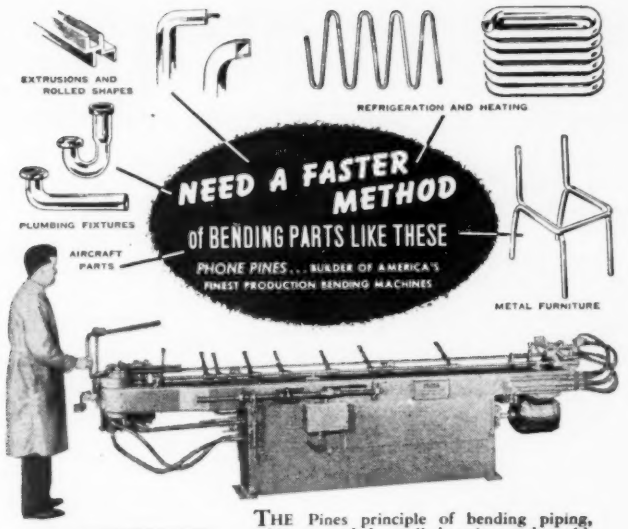
a 4-page folder, produce quality and quantity, speed with accuracy, and production plus precision. The horizontal machine features a self-contained coolant system, and automatic stop control, etc. **Zagar Tool, Inc., 2400 Lakeland Blvd., Cleveland 23, Ohio.**

15. **"Guide To Steel Selection"**, 4-page bulletin, lists all grades of hot rolled and cold finished carbon and alloy steel bars with characteristics, mechanical properties and uses. Helps select the suitable and economical qualities of bar steel for various jobs. **Joseph T. Ryerson & Son, Inc., 7558 W. 16th St., Chicago, Ill.**

16. **Circular Sawing Handbook,** covering 24 pages, contains information on the operation of circular saws and how to overcome difficulties; tables covering the proper selection of blades; the operating speeds and feeds and tooth angles for sawing ferrous and non-ferrous materials. **The Motch & Merryweather Mchy. Co., 715 Penton Bldg., Cleveland 13, Ohio.**

17. **Recording Gauge** bulletin G621 covering 32 pages, contains information on pressure gauges, vacuum gauges, barometers, etc.; measuring elements, operating principles, recording charts are described. **The Bristol Co., Waterbury 20, Conn.**



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18. 900 series Flexible Shaft Machines, equipped with 1/15 hp universal motors which have the forced draft aircooling feature, are portable and take up minimum bench space. A choice of 5 handpieces quickly detachable is offered. **Foredom Electric Co., 27 Park Pl., New York 7, N. Y.**

19. "DB" Recessing Tools are fully described as well as their use in performing back-chamfering, back-counterboring, recessing, thread and grinding reliefs, etc. in Manual DB. Photographs, diagrams, sketches and cut-away illustrations. **The Maxwell Co., 221 Broadway, Bedford, Ohio.**

20. The Cushman Power Wrenches, equipped with a variable torque control, automatically and accurately maintains preselected chuck jaw pressure; also reduces loading and unloading time. Descriptive and technical data in 7-page bulletin No. 215. **The Cushman Chuck Co., Hartford 2, Conn.**

21. Drill Guide Bushings and Liners, over 1700, for "micro" size drills ranging from No. 80 to 3/16" described, illustrated in 2-page bulletin. Dimension tables are also included for the 4 body sizes available in 3 to 6 lengths each. **Micro Drill Guide & Eng. Co., 18515 Weaver Ave., Detroit 28, Mich.**

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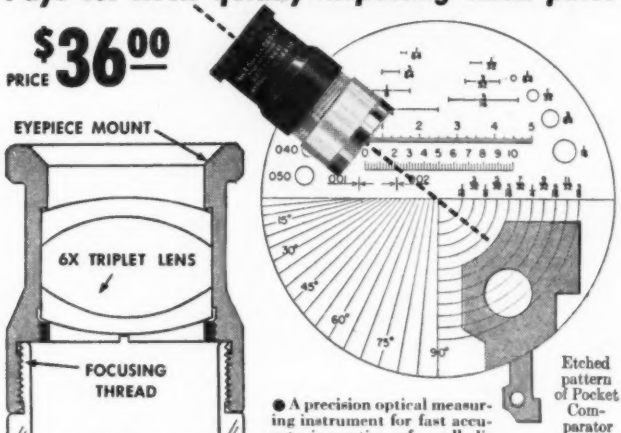

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22. Hydraulic Valves, for pressures up to 1500 P.S.I. are illustrated and described in the new 52-page catalog section 202. The simplified Rivett design with a balanced type piston, "O" rings for sealing the stem and cover, and large passages for unrestricted flow is featured. **Rivett Lathe & Grinder, Inc., Brighton 35, Boston, Mass.**

23. Drill Heads, containing various numbers of spindles for reaming, facing, tapping, threading, etc., are adjustable and permit drilling on very close centers. Full details by cross-section engineering drawings, installation photographs, in 28 pages. **U. S. Drill Head Co., Dept. D, 616-18 Burns St., Cincinnati 4, Ohio.**

24. K & T CK Line of plain and universal knee-type milling machines feature greater rigidity, cutting efficiency, horsepower, smooth feed performance, and non-glare rapid-set dials, etc. Attractive four-color bulletin. **Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.**

25. Steptoe-Western High Speed Shapers, 12″ and 15″, the latest development in crank shapers and the first and only

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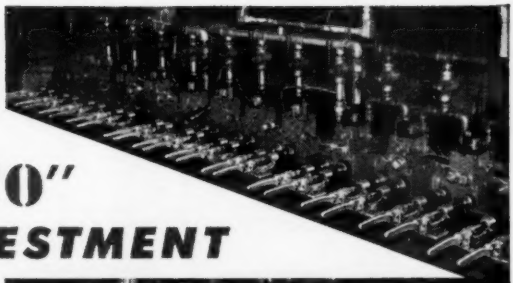

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Photos courtesy Ross Operating Valve Co. Detroit, Mich.

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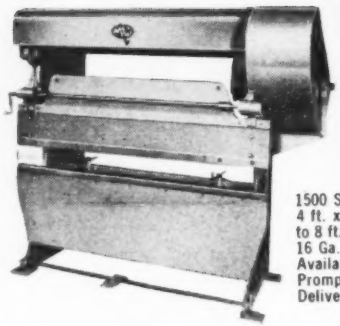

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18 speed, all-geared, shapers on the market, with ram speeds up to 200 strokes per minute are described in 7-page catalog 5021. **Western Machine Tool Works, Holland, Mich.**

26. Attachments and Accessories for surface grinders are illustrated and discussed in catalog No. 310 covering 15 pages, some of which are the vernier fine-feed attachments, the index grinding fixture, and the Taft-Peirce grinding spindle. No. 1 precision and 6" rotary surface grinders are also described. **The Taft-Peirce Mfg. Co., Woonsocket, R. I.**

27. "T" Series Compressors consists of two lines: 100-125 pounds; 200 pounds for continuous service, and up to 250 pounds on intermittent pump-up service. 7-page bulletin shows sizes, models, cross-sectional views, engineering data, and dimensions. **Ingersoll-Rand, 11 Broadway, N. Y. 4, N. Y.**

28. Plano Type Surface Grinder, with either horizontal or vertical spindle is ideal for grinding pieces having large flat surfaces such as bases, tables, plates, etc. Full details and specifications in bulletin No. 345-2RM. **Mattison Machine Works, Rockford, Ill.**

29. Safety "Fluid-Lite" Eyeshield, No. 630 with a 6"x10" window affords 60% greater visibility and protection. Features full adjustability and specially designed bulbs to withstand vibration. **Stanley Electric Tools, 512 Myrtle St., New Britain, Conn.**

30. Hanna Cylinders, for every mounting requirement, for hunderds of applications where a controlled push, pull, lift, press or clamp is desired, and for working pressures up to 1500 p.s.i., are described in catalog No. 233-A. Includes 28 pages of illustrations, specifications, design, construction and operation fea-

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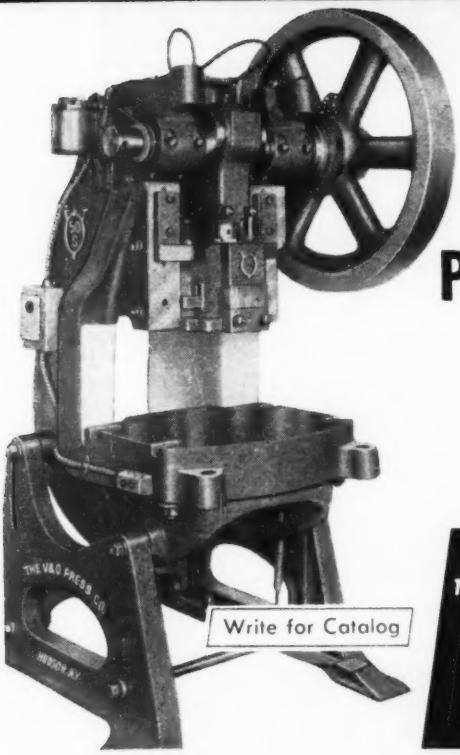

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tures. **Hanna Eng. Works, 1765 Elston Ave., Chicago 22, Ill.**

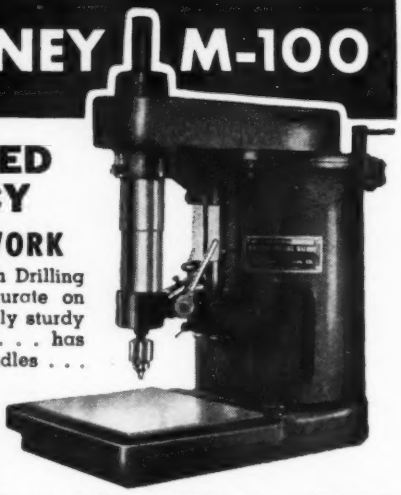
31. Technological Unemployment. The effect on employment of production workers because of installation of labor-saving equipment is discussed in an 8-page booklet compiled by Denham & Co., Detroit. This year by year study (from 1910 to 1950) may be secured by writing **Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.**

32. "Manual Lincolnweld" unit consists of a control case, wire reel case, conductor cable, welding gun and a cable assembly. It minimizes weld distortion, produces smoother welds, and cuts spoilage losses, etc. **The Lincoln Electric Co., Cleveland, Ohio.**

33. Sun Hydraulic Oils are discussed and recommended applications are given to help select the most advantageous oil for each application in a new 8-page booklet. Case histories with in-action photographs are also included. **Sun Oil Co., Philadelphia 3, Pa.**

34. Fluid Pressure Boosters save space and weight, cut costs and increase efficiency in clamping, punching, shearing, stamping, etc. Bulletin B-200 covering 12 pages gives complete engineering, installation, mounting, and operation data. The "Air Miser" dual pressure booster which saves 95% in air consumption is featured. **Miller Motor Co., 4027-35 N. Kedzie Ave., Chicago 18, Ill.**

SIGOURNEY M-100



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This sturdily constructed bench drilling machine is available in 1, 2, 3 and 4 spindle models . . . speeds from 4,000 to 10,000 r.p.m

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35. Press-Rite Power Presses open back inclinable, feature reinforced heavy duty frame, non repeat single stroke safety mechanism, and 4 point sliding key clutch. Other outstanding features and technical data are contained in a 7-page catalog available from **Sales Service Machine Tool Co., 2357 University Ave., St. Paul 4, Minn.**

36. Coolant System, mist pipe for grinding carbides on No. 2 cutter grinder, aids in producing better finishes and in reducing grinding time. Guards may now be obtained for a choice of six wheels. Circular No. M-1716 describing this attachment will be sent upon request to **Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**

37. Industrial Thermocouples for aircraft, engines and industrial plants, protection tubes, and accessories are described and illustrated in 8-page section No. 22. Information on lead wires, quick coupling connectors and pyrometer instruments is also included. **Thermo Electric Co., Inc., Fair Lawn, N. J.**

38. "When Your Business Needs a Lift", a double-fold circular, illustrates many of the practical applications of the Economy Type D "Shoplifter" in handling materials loads in shops or stores. Specifications and prices. **Economy Eng. Co., 4505 W. Lake St., Chicago 24, Ill.**

39. Die Sets (master and commercial), special sets (in semi-steel and all steel),

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SIZE	No. 3R3	No. 3R5	No. 3R6	No. 4R10
Cuts sheet or plate up to	1/8"	3/16"	5/16"	3/8"
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die makers' accessories and toolroom and machine shop equipment are covered in a new 72-page catalog. Contains color tabs for each section for easy identification, photos, diagrams and easy-to-read tables simplify rapid selection of die set style, size and price. **The Producto Machine Co., 960 Housatonic Ave., Bridgeport, Conn.**

40. Oak-News Service in its recent issue for Sept.-Oct., features such articles as Regular Cleaning Minimizes Slime, Conveyor Lubrication Important to many Industries, How to make Parts Cleaning Easier, etc. **Oakite Products, Inc., 22 Thames St., New York 6, N. Y.**

41. An Index to the products and services in the machinery threading tools, electrical specialties, and contract manufacturing divisions are included in bulletin No. NA-1, 15 pages. Some of the machines illustrated and described are: multiple spindle automatic chucking machines, thread and form rolling machines, vertical threading machines, and solenoids, chronologs, switches, and counters. **The National Acme Co., 170 E. 131st St., Cleveland 8, Ohio.**

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EXPANSION REAMERS — FORM TOOLS — CENTERS — MASONRY DRILLS
SPECIAL TOOLS

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42. Die Set Puller, leader pin oiler, constant level lubricator and drill rod rack is depicted in an attractive, new, 4-page bulletin. Complete data covering these products is given as well as prices and specifications. **Acro Metal Stamping Co., 338 E. Reservoir Ave., Milwaukee 12, Wis.**

43. Series 60 Engine and Toolmaker's Lathes available in 12″, 14″, 16″, and 20″ sizes, are described and illustrated in a new 44-page catalog, No. 1113. Major design engineering features and performance improvements are reviewed. Air-gage tracer, motor-trace, and Keller controls, methods, of cost--cutting, are also discussed. **The Monarch Machine Tool Co., Sidney, Ohio.**

44. 1600 Series Light Duty Drill Presses including 12 models in 1, 2, 3, and 4 spindle units, bench and floor type, are shown and described in a recent brochure. Assembly parts for special set-ups, tapping machines and a complete line of accessories are also included. **Boice-Crane Co., 936 Central Ave., Toledo 6, Ohio.**

45. "All-Purpose" Jaw Clamps eliminate the need for U-clamps and straps by providing force in two directions simultaneously, and speed set-up time by enabling the operator to control both forces with one socket screw. Typical set-ups, illustrations of the 4 available sizes and chart of T-nut sizes. **J & S Tool Co., Inc., 471 Main St., E. Orange, N. J.**

46. Model 8A Automatic Lathe has a quick cycle change-over for both short and long runs. The speeds and feeds are for an unusually wide range of work. Eight-page circular describes this lathe, and also gives complete specifications

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and available cycles. **Sundstrand Machine Tool Co., 2535 11th St., Rockford, Ill.**

47. Electron Drill, hard metal drilling machine with motor driven automatic feed guaranteed to equal or exceed the speed of twist drilling, is illustrated and described in a 4-page folder. Complete with cutting speed charts. **Elox Corporation of Michigan, 744 N. Rochester Rd., Clauson, Mich.**

48. Allite Dies for producing experimental or short run parts have a low cost compared to steel because they eliminate most machining. Bulletin also describes the coordinated foundry and die shop facilities at Richards Bros. Div. **Allied Products Corp., 12621 Burt Rd., Detroit 23, Mich.**

49. Cycle Annealing process, in which the time-temperature program control is used for the annealing of steel forgings and other parts is described in a 4-page technical bulletin. Included are radiant tube-fired and direct-fired installations, and annealing treatments for typical steels. Send for SC-146 to **Surface Combustion Corp., Toledo 1, Ohio.**

50. A Larger Jig Grinder, model No. 2,

★ ***PRODUCTION INCREASED FROM 18 TO 31 PIECES PER HOUR*** machining pipe union from 18-8 stainless steel in single spindle automatic *after* changing over to Stuart's THREDKUT 99.

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corrects location and finish-grinds regular and irregular contours as well as straight and tapered holes. The automatic up-and-down feed control and a specially designed slot grinding attachment is described. Also included are typical grinding jobs and complete specifications. **Moore Special Tool Co., Inc., 728 Union Ave., Bridgeport 7, Conn.**

51. Gear Couplings save time and labor costs, save design space, weight, and protect capital investment. Descriptions and photographs of typical installations as well as detailed plan drawings and specifications. **Sier-Bath Gear and Pump Co., Inc., 9252 Hudson Blvd., North Bergen, N. J.**

52. Packaging Program for roller chains and parts is announced and described in a 4-page folder. All available standard packaged quantities are listed together with package weights and list prices. **Morse Chain Co., 7601 Central Ave., Detroit 8, Mich.**

53. Tygon Paints, specialized protective coatings to provide longer lasting protection for surfaces exposed to acids, alkalies, oils, etc., are discussed in 11-page bulletin 712. It tells where and how to use the paint and where not to

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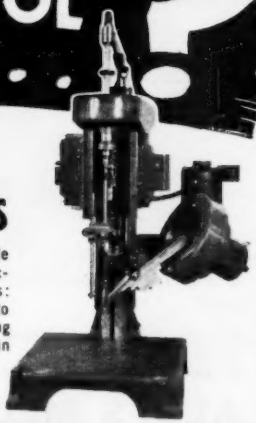

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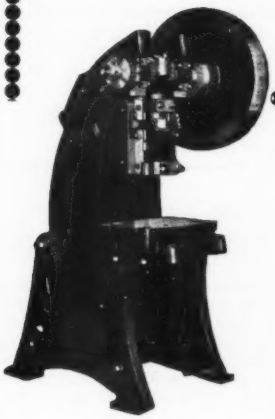

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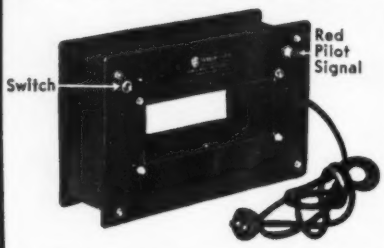

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use it; corrosion resistant tables are also included. **The U. S. Stoneware Co., P. O. Box 350, Akron 9, O.**

54. "All Under One Roof", a 4-page brochure, is illustrated with action photographs of jobs both in the laboratory and field, and portrays the work of scientists, engineers, consultants and laboratories at Sam Tour & Co. **Sam Tour & Co., Inc., 44 Trinity Place, New York 6, N. Y.**

55. Methods of Working Seamless Tubes and pipe of the intermediate B & W croloys, ferritic airhardening alloys containing ½ to 9% chromium, are discussed in a new handbook, No. 9B. The pocket size book with leatherette covers contains illustrations, diagrams and reference tables, and latest data for handling of these alloys to obtain maximum benefit from their use. **The Babcock & Wilcox Tube Co., Beaver Falls, Pa.**

56.. Moisture-Proffer Abrasive Cutting Wheels are described in a 6-page folder, which also illustrates advantages and convenient features of this new development in abrasives to assure maximum cutting efficiency. Wheels are "always clean, ready-to-use", and have "no chance of loss from moisture, dirt, oil, or grease." Booklet may be obtained from **Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago 7, Ill.**

57. Flexible Metal Hose catalog No. 500 contains the latest data compiled by the company's engineers. Interlocking high pressure hose, conveyor hose for ventilating and exhausting, and metal lined gasoline hose are among those described. **Mr. David M. Fuchs, Atlantic Metal Hose Co., Inc., 123 W. 64th St., New York 23, N. Y.**

New Books

Plant Engineering Handbook

By William Staniar, Editor-in-Chief. Published by McGraw-Hill Book Company, New York, 1950. 1,955 pages, $15.00.

Recently published, this compendium of industrial know-how tells how to manage, operate and maintain industrial plants, and presents the essentials of good plant engineering practices in 77 major areas of plant operation and maintenance. This is an excellent book de-

signed to meet the needs of those men who are responsible for efficient and economical operations and production in industrial manufacturing plants such as: plant managers, engineers, and superintendents.

The book deals with industry's consumption and conservation of basic resources, with management engineering, with industrial construction, fire protection, maintenance, with industrial power and its uses, with air handling, materials handling, and the handling of services. Specialized subjects of instrumentation, bearings and lubrication, engineering materials and mechanical power also are presented, plus many others that are vital to efficient industrial and institutional operations.

The author, who was associated with E. I. duPont de Nemours for forty-two years, has written two books on mechanical power transmission also published by McGraw-Hill and has likewise contributed the mechanical power section in the Encyclopedia Britannica.

Some of the various topics discussed are: basic industrial costs and cost reduction, management engineering, industrial water purification and treatment, welding, metallurgy and corrosion, vibration control and noise silencing, industrial process air conditioning.

Engineering Metallurgy

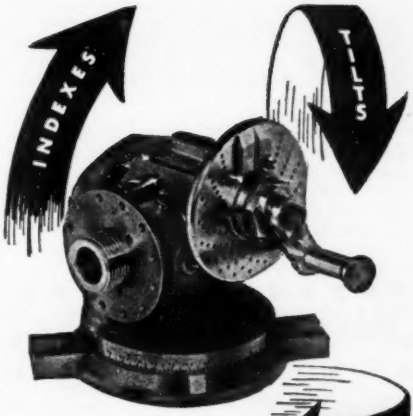
By Alexander P. Gwiazdowski, M. E. Published by C. C. Nelson Publishing Company, Appleton, Wisconsin, 1950. 260 pages, $4.00.

This is a practical working text and reference for draftsmen, designers, engineers, production leaders, and supervisors of heat-treating departments. It is designed especially to give basic metallurgical information about the nature and characteristics of the commercially important metallic elements and their alloys.

In preparing the book, the author has five objectives in view: (1) Concise and clear definitions, (2) principles, (3) selection of materials, (4) selection of heat treatments, and (5) engineering specifications.

The first four chapters deal with metals, and their various properties and uses, as well as the structures and compositions of ferrous alloys; several chapters deal with ferrous and non-ferrous alloys. Rolling processes, applications of S.A.E. steels, high-speed and commercial tools steels, corrosion and heat-resisting steels, and bearing metals are some of the other items of interest discussed.

Mr. Gwiazdowski, an experienced engineer and educator, taught mechanical



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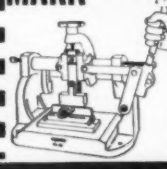
engineering at Toledo University and production engineering at the University of Michigan and Case Institute of Technology, and at the present time is Professor of Industrial Engineering at Tri-State College.

Data dealing with chemical analysis, applications, and heat treatments of various tools steels was obtained from metallurgical departments of industry. All the material has been tested and is suitable for use in any shop, small or large.

MARK WITH ACROMARK



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Small Plant Management

Prepared under the auspices of the American Society of Mechanical Engineers. Published by McGraw-Hill Book Co., New York, 1950. 499 pages.

This guide to modern on-the-job management techniques shows how small plants fit into the economic picture, how they are set up and operated, and the over-all opportunities for small plants both here and abroad. Edward H. Hempel, Editor-in-Chief and Chairman of the Small Plant Committee of the ASME, and twenty contributing editors have pooled their knowledge and experience to make this guide suitable for use in the small plant.

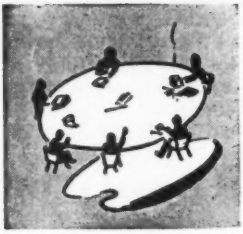
From the concepts and principles of scientific management to considerations in financial planning—from the legal side of production planning to sales tools and their use—from building employee moral to the know-how rules of machine planning—this book analyzes the many functions that aid in the establishment of efficient and profitable management Each of the twenty chapters is an individual treatise by one of the country's leading authorities on small plant management.

Bliss Power Press Handbook

Published by the E. W. Bliss Company, Toledo, Ohio, 1950. 700 pages, $7.50.

Greatly enlarged over previous editions, this publication is the most complete handbook ever produced exclusively for the users of Bliss presses. It is intended to serve as an authoritative guide to engineers, production executives and students concerned with the operation of Bliss presses and dies in the manufacture of pressed metal products.

Included in the text are liberally illustrated sections on primary sheet metal-working operations, types of equipment used to perform these operations, tables of useful information, methods of computing press capacity and blank size for many types of work, how to select the proper press for a given job and a comprehensive glossary of terms used in the industry. Of special interest to owners of Bliss-built presses are almost 600 pages containing operating and maintenance instructions and parts lists for a wide variety of Bliss equipment, as well as descriptions of Bliss presses, die cushions and other Bliss manufactured accessories.



MTBB
JANUARY 1951

News of the Industry

TOOL AND DIE MANUFACTURERS FACE LABOR SHORTAGE

The fifth annual meeting of the National Tool & Die Manufacturers' Association took place in Cleveland, Ohio., Oct. 29 - Nov. 1., with approximately 200 delegates attending. The occasion was observed by the election of the new annual slate of officers, consisting of the following: Herbert F. Jahn, president, head of B. Jahn Manufacturing Co., New Britain, Conn.; first vice-president, R. H. Cope, the comptroller of Bunell Machine & Tool Co., Cleveland; second vice-president, Alfred Reinke, of Gus Reinke Machinery & Tool Co., Hillside, N. J.; secretary, Herbert C. Murrer, of Murrer Company, Cincinnati; re-elected treasurer was Herbert Harig, vice president of Harig Manufacturing Co., Chicago; re-elected executive secretary, George S. Eaton, with headquarters in the Union Commerce Building, Cleveland.

The Tool and Die Manufacturers were addressed by Col. Joel G. Griffing, Chief, Manpower Division, Selective Service System, Washington, who stressed the fact that the NTDMA, already hard-pressed by a serious lack of man-power, should not place too great hopes upon deferment of employees between the ages of 19 and 35, even though deferments might be essential to the employers themselves. Col. Griffing suggested that firms should review the draft status of all key personnel between those age limits, and should deferments appear essential for some of them, to file requests as soon as possible with the local Selective Service office.

The tool and die industry, already suffering from a serious shortage of manpower, is now particularly concerned by the draft of young employees, since the average age of its workers is younger than it was at the beginning of World War II. The industry now has fewer men employed than it did two years ago; at the bottom of the difficulty lies the fact that following the years immediately after the war, the tool and die industry felt a business recession. Employees were allowed to leave for other jobs in fields where skilled man-power was needed; the present result has now resolved itself into a serious labor shortage.

In a recent interview, the new president of NTDMA, Herbert F. Jahn, stated that since the first of July, the business pickup has been so sharp that many shops could hire approximately 50% more employees. Some 80% of new orders which have been received by his company since that date have been to fill defense orders. Jahn further declared that the tool and die industry had enough plant capacity to cope with the production crisis, but that new machinery would be required. Much existing machinery is now creaking along at ages from eight to ten years, in some instances. He stated that he sees no tool shortage, and spoke in favorable terms of the quality of tool steel manufactured during World War II.

The Lapeer Manufacturing Company, developers and producers of Knu-Vise toggle-action clamps, have moved their

sales offices from W. Grand Blvd., to a new building at 1144 W. Baltimore Ave., Detroit 2, Mich. The manufacturing operations continue at their plant located in Lapeer, Mich.

Pivot Punch & Die Corporation Doubles Size

Robert H. King, vice-president and treasurer of The Pivot Punch & Die Corporation, North Tonawanda, N. Y., announces the recent completion of an expansion program that has doubled the size and production capacity of the company.

The purchase of the entire building at 365-373 Old Niagara Falls Blvd., and the installation of new equipment and production methods has also necessitated increasing the number of employees from 60 to 120. Ideal working conditions are provided through new ventilation control, non-glare lighting, work-level production flow, and numerous other facilities. Complete exterior remodeling of the plant will soon be completed.

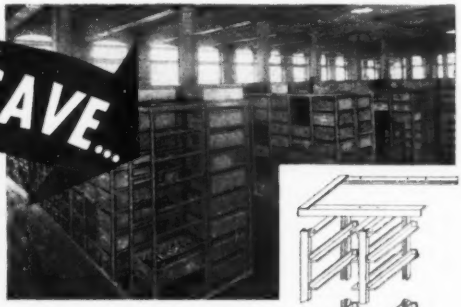
New equipment which facilitates the production and assembly of even larger dies and tools than heretofore achieved includes a 5-ton crane over a 60-foot span, and a complete line of the most recently developed equipment for layout, heat-treating, testing and inspecting as well as metal cutting and finishing.

Richard H. Demott President of SKF

Beginning as a salesman with SKF Industries, Inc., in 1910, Richard H. DeMott recently became president of the firm, succeeding William L. Batt, who resigned recently to return to government service as chief of the E.C.A. mission to Great Britain.

Mr. DeMott, vice president in charge of sales since 1948, has been a leading pioneer in the use of anti-friction bearings in the papermaking, textile, railroad, electric motor, and other industries. His early positions included those of draftsman, salesman, and a power engineer with the Public Service Company of New Jersey before becoming affiliated with SKF in 1915.

RACK 'EM and SAVE...



SAVE SPACE *Sterling Racks* utilize rent-free air space . . . keep your parts and tools neat and orderly.

SAVE TIME Materials "filed" in *Sterling Racks* are always available — upper and lower boxes equally accessible.

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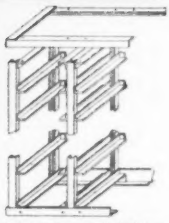


Sterling Racks and boxes in modern stockroom. These five foot sections are convenient for shipping, assembling, and relocating.

Made to fit your present shop boxes or boxes supplied. Available in five section units of rigid construction—Prompt Delivery. Write today for literature and prices.

Drawing shows how top and bottom frames are bolted to uprights. Racks are shipped knocked-down.

Sterling Factory Equipment Co., 187 Charles St., Providence, R. I.

Bay State Abrasive Products Co. Continues Expansion

The Board of Directors of the Bay State Abrasive Products Company, Westboro, Mass., Leonard M. Krull, chairman, O. S. Buckner, and Earl C. Hughes, recently stated that the improved plant layout, new machinery, together with teamwork on the part of all employees has resulted in lowered cost and increased profits. This improved condition is to be shared with all employees, and beginning November 1st an increase of 10 cents per hour to all hourly workers and a 6% increase for salary workers went into effect.

Earl C. Hughes, vice president, stated the directors sensed that the expansion program of $250,000 that has been in force since May would not be adequate to cope with the increasing demand for Bay State products. Consequently, it was necessary to increase the original appropriation to $350,000. Contracts for the additional work have been already released and work is now in progress.

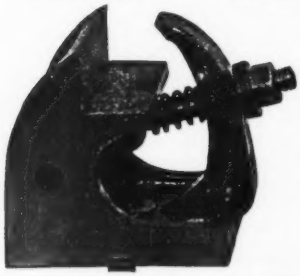
Die Supply Company in New Plant

The Die Supply Co., formerly of 5349 St. Clair Ave., has moved into its new $200,000 plant at 1400 Brookpark Road, Cleveland, Ohio. Officers of the company are: J. R. Fitzsimmons, chairman of the board; his two sons, Warren H Fitzsimmons, president; Joseph T. Fitzsimmons, vice president; and Robert E. Shaw, secretary and treasurer.

The 200 by 130 foot building is an attractive, one story, modern functional design, of steel and buff brick construction. This building, containing 50% more floor space, was designed around production lines to obtain utmost efficiency. Greatly expanded facilities include additional machinery for manufacturing the company's Die-Co Die Sets, and increased capacity for inventory storage of tool, die and machine shop accessories to meet the growing demands of the metal working industry.

The firm now offers continuous quality control, from its own steel warehouse, through torch cutting, welding, normalizing, to finish-machining.

HART MILLING FIXTURES



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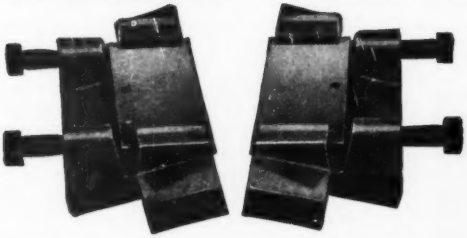
Eliminate many needs for Special, Expensive Jigs and Fixtures

These fixtures make themselves popular and profitable in any shop—are used in either horizontal or vertical position. Suitable to hold round hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on the bottom as well as on the back. Generally sold in pairs. Made in 4 sizes—to hold stock from ½ to 5 inches.

HART MACHINE VISE JAWS



These Jaws are very useful on any machine table. They clamp or bolt to the table, the angles firmly holding the work down. Each hardened tool steel jaw measures 3"x6"x½". The angle edges are serrated.

We also manufacture Hart Index Centers.

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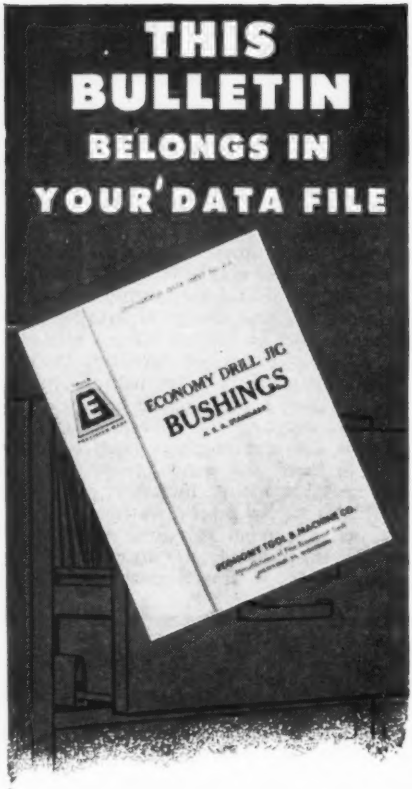

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new gages and gages salvaged by hard chromium plating.

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1829 S. 68th St., Milwaukee 14, Wis.

Gilman Engineering & Mfg. Co., Opens Milwaukee Office

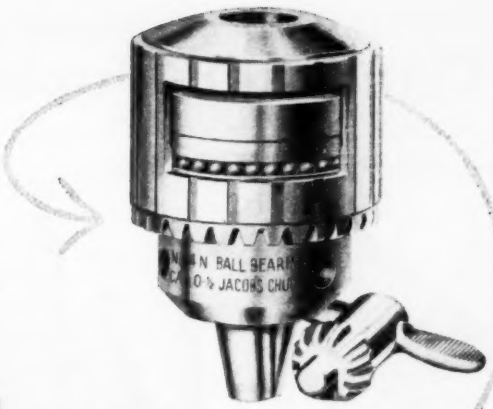
Russell T. Gilman, co-founder of the Gilman Engineering and Manufacturing Co., Janesville, Wisconsin, has recently opened offices at 525 E. Michigan St., Milwaukee, Wis. His office will represent only top precision machine tools, including outstanding Swiss machinery.

Russell T. Gilman

Mr. Gilman brings to his new enterprise 15 years of successful fine machine tool manufacturing. The offices include a showroom of representative machines. The line includes jig borers; jig grinders; optical comparators; microscopes; toolmaker's lathes; Swiss automatics; gear hobbers; burnishing machines and pinion cutters.

Mr. Gilman has announced that his organization is offering advisory service on machine tool problems.

The Producto Machine Company, Bridgeport, Conn. announces the opening of a new Producto Warehouse and Assembly Plant at 3632 Delphos Ave., Dayton 7, Ohio. The new warehouse is now equipped to stock, assemble and distribute die sets in the South Central Industrial area. Neil Griest, named branch manager of the Producto Dayton Office, is responsible for both assembly and sales, and will be assisted by Robert Whaley. The Dayton Warehouse will stock a complete line of tool and die makers' supplies.



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Thanks to its ball bearing construction and frictionless grip, the Jacobs Ball Bearing Chuck easily registers the world's firmest grip . . . eliminating tool slippage and reducing drill breakage. That is why it is preferred the world over for heavy-duty drilling under toughest conditions.

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The Jacobs Plain Bearing Chuck is especially designed for portable drills, light- and medium-duty drill presses and lathes. Its high accuracy, rugged construction, tremendous strength and gripping power have made it industry's overwhelming favorite, here and abroad.

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A Boring Head That Won't Face Is NOT Complete

NEW! Re-designed! Added Features!

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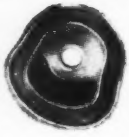

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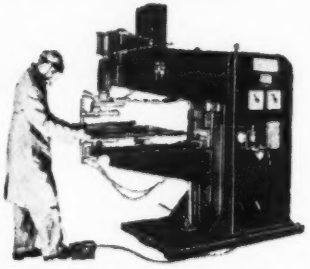
SPOT • BUTT • GUN • SEAM

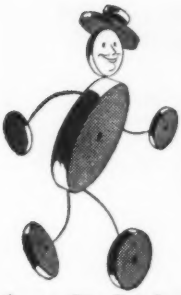
For all types of welding in sizes: ¼ to 300 KVA. Foot, air or motor operated.



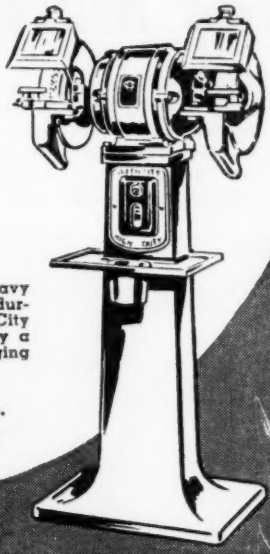
We invite contract spot or butt welding in large or small quantities.

EISLER ENGINEERING CO., INC.
762 South 13th St., (Near Avon Ave.)

Chas. Eisler, Pres.
Newark 3, N. J.



Cut grinding costs . . . with rugged QUEEN CITY Grinders



Queen City Grinders are built to stand up under the heavy work that pours through the shop daily. Noted for their durability, freedom from downtime and low cost, Queen City Grinders cut grinding costs to the bone. • Order today a battery of these low cost grinders and eliminate "ganging up" around one lone grinder.

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Machine Tool Co.
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QUEEN CITY MACHINE TOOL CO

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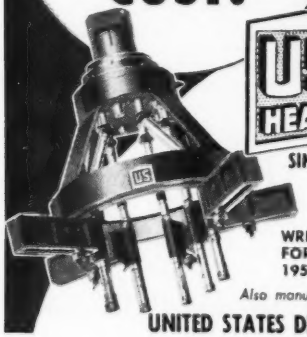

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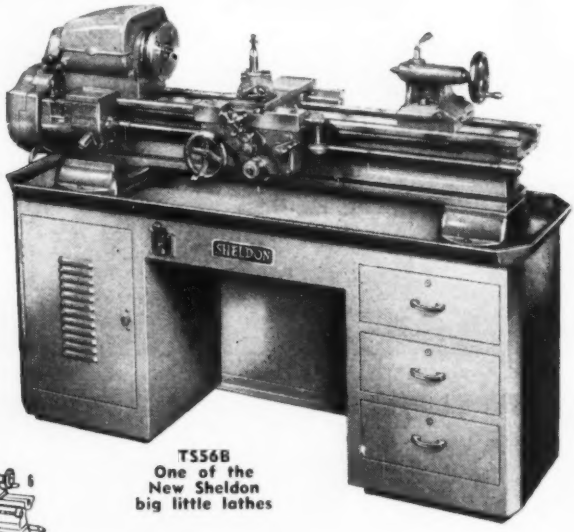
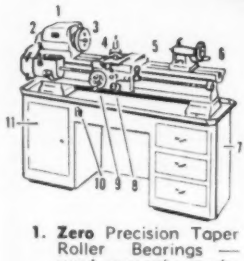


TS56B
One of the New Sheldon big little lathes



1. **Zero** Precision Taper Roller Bearings — most accurate made.
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9. Standard big lathe controls.
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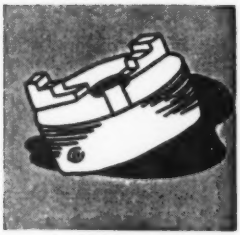
Sheldon Machine Co., Inc., 4242 N. Knox Ave., Chicago 41, Ill., U.S.A.

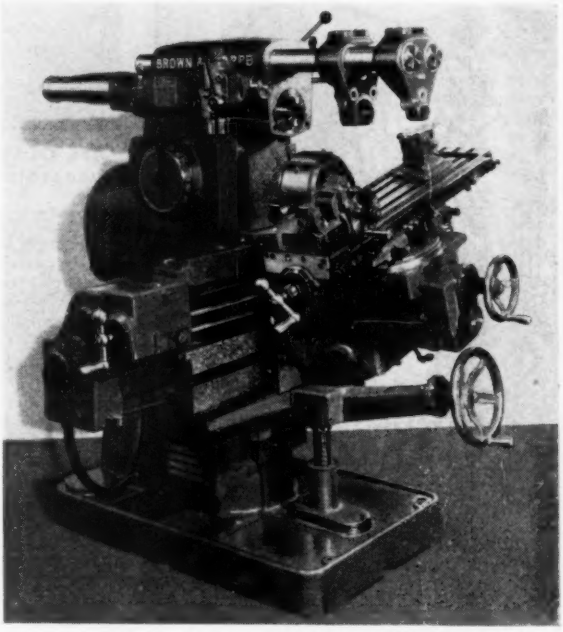


MTBB
JANUARY 1951

What's New in Metalworking

BROWN & SHARPE NO. 0 OMNIVERSAL MILLING MACHINE

The new No. 0 Omniversal Milling Machine has recently been introduced by Brown & Sharpe Mfg. Co., Providence, R. I. This unit is designed primarily for tool room and experimental laboratory milling. The Omniversal is stated to have all the fundamental movements and adjustments which are common to the universal milling machine, and in addition it is provided with an angular adjustment of the table in a vertical plane at a 90° angle to the spindle and a horizontal feed of the entire knee assembly in the same plane. The new unit is also equipped with the versatile gear-driven Omniversal milling head which is adjustable parallel to the overarms, is arranged for universal angular adjustment, and has a 2″ hand feed of the spindle. It may be used either independently or in conjunction with the machine spindle.

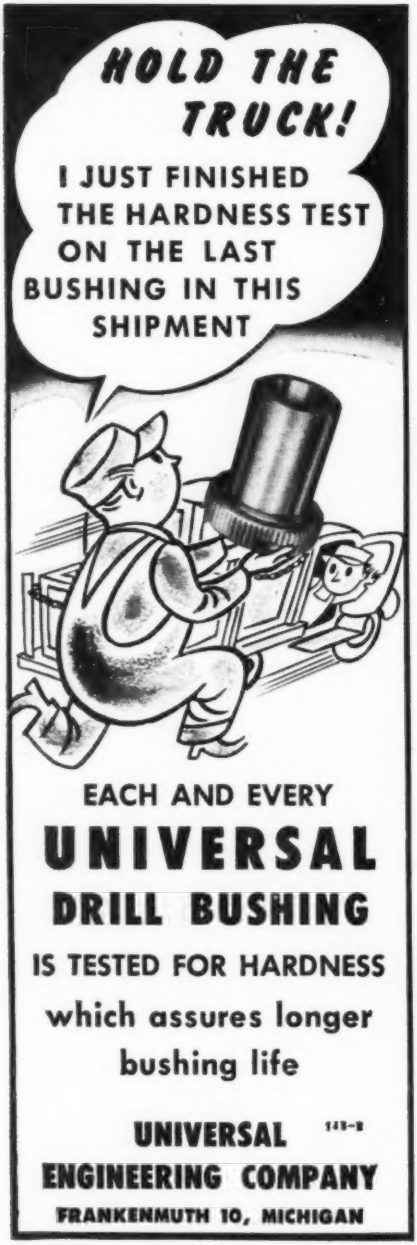


No. 0 Omniversal Milling Machine

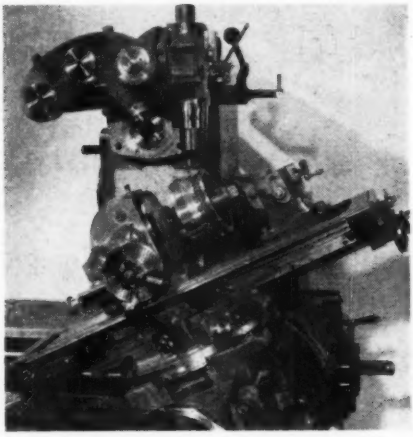
The Omniversal is stated to provide an easy and accurate means of obtaining both simple and compound angular settings in any plane. Work pieces may often be milled in a number of planes, or drilled, bored or reamed at many different angles without the use of special fixtures or attachments, and without the need of relocating the work in the holding device.

The machine is provided with 18 spindle speeds in approximately geometrical progression, from 40 to 1530 r.p.m. for the machine, and from 76 to 2900 r.p.m. for the Omniversal head. An infinite number of feed changes from ½″ to 15″ per minute meet a wide variety of milling requirements.

The longitudinal feed capacity of the table is 17″, automatic; of the knee slide, 17″ automatic. Combined longitudinal feed, with the table in horizontal position is 34″, automatic. The transverse feed is 5¾″, automatic (6″, hand). The centers have a 10″ diameter swing; they take a



17¾" length. The vertical distance from the center of the spindle to the under side of the overarms is 4-11/16".



The Omniversal milling head milling accurately spaced angular holes

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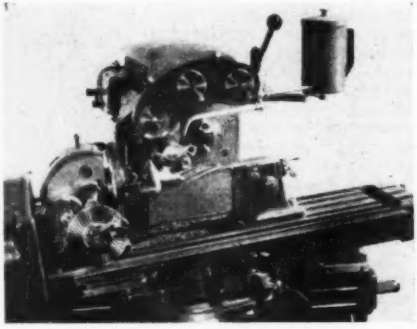
The new B & S Omniversal incorporates improved electrical controls, automatic lubrication, a heavy machine column cast in one piece with thick walls and rigid internal bracing; it is provided with extended spindle face. The unit is further



Cutting a spiral taper reamer

• • •

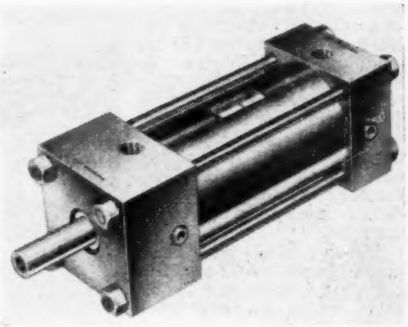
provided with convenient speed and feed controls. According to Brown & Sharpe, the capabilities possessed by this new machine simplify many set-ups that would be otherwise difficult to obtain.

Modernair Square Circle Cylinders

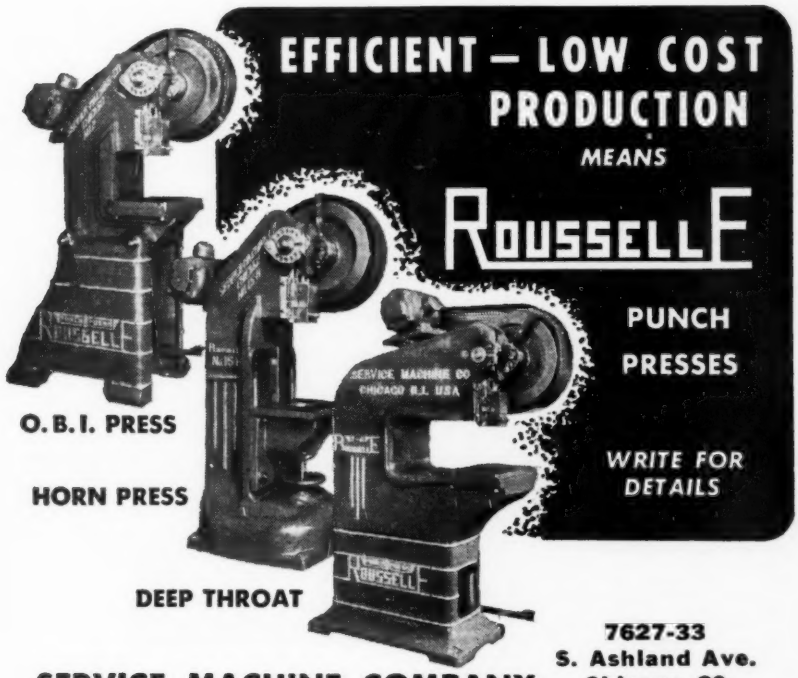
A new line of "Square Circle" cylinders, designed to permit single or multiple installations in a fraction of the space required for conventional models is announced by Modernair Corporation, 4222 Hollis St., Oakland 8, Calif.

Diverse interchangeable mountings, machined from solid bar stock, permit a variety of applications with a single Modernair Square Circle Cylinder. Fixed or adjustable cushions are available for either or both ends of all cylinder sizes from 2¼" up. (Bore sizes now in production include 1½" to 14".) When flush mounted, four Square Circle Cylinders fit in the space of three round body models. Despite short overall and length dimensions, the Square Circle Cylinder provides equal power, requires less maintenance and gives longer service than bulkier conventional type cylinders, according to Modernair Corporation.

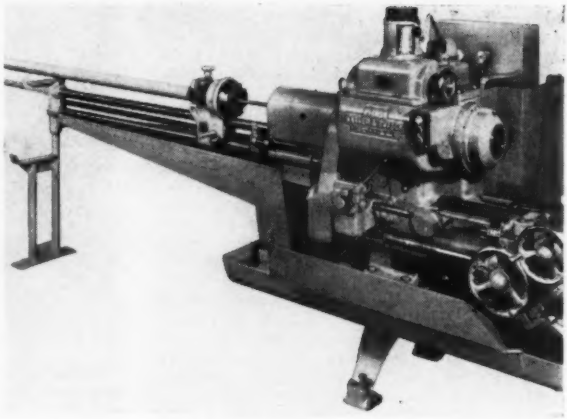
High tensile strength tie rods and piston rods overcome inertia loads and high velocity pounding. Long-life piston packing cups prevent leakage past the pistons, without sacrificing durability and without the customary resultant high friction.



Oilite bearings, a solid steel head, a non-corrosive brass barrel, combination piston rod wiper and self-adjusting front gland provide improved construction features in a durable and more compact unit.



W & S Hydraulic Collet Chuck and Bar Feed



A hydraulic collet chuck and bar feed is now offered as a standard accessory for No. 3, 4, and 5 turret lathes, made by The Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio. The design involves a bar feed stand, a chuck-type bar feed head, a control valve with a single lever for all functions, and associated hydraulic equipment.

After a bar has been loaded in the stand and the bar chuck jaws are properly set, a forward pull on the headstock-mounted control lever actuates the hydraulic mechanism to advance the bar for a distance determined by the position of stroke adjusting nuts against a scale.

When the lever is pushed away from the operator to close the collet hydraulically and reverse the pusher head travel, the bar feed head strips back off the stock. The lever then automatically returns to a central, neutral position.

The bar feed chuck jaws are manually adjusted with a chuck wrench for the proper degree of gripping, and the collet is adjusted in the usual manner. A direct-

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FURNACES

reading pressure gauge atop the headstock indicates the degree of collet tightness to aid in set-up.

The unit is said to provide a fast-acting, positive bar feed under fingertip control to speed the production cycle. For optimum efficiency, the collet chuck and bar feed is offered in two sizes, one suited to the No. 3 or No. 4 machine, the second applicable to the work capacity of the No. 5 Warner & Swasey turret lathe.

Coil Cradles Minimize Slippage

A new line of coil cradles with capacities up to 15 tons has been developed by the E. W. Bliss Co., Toledo, Ohio. in cooperation with a major automobile manufacturer. Available in several sizes, the cradles can be equipped with special high friction cast iron or formica roll surfaces

to minimize slippage on out-of-round coils. The rolls are mechanically driven through an adjustable speed drive. Main gears are fully enclosed and splash lubricated. The rotary side guide plates are mounted on roller bearings and are adjusted manually (as illustrated). Provision is made for motor adjustment of these guide plates where desired.

A feature of the design is the low entrance side of the cradle, allowing the coils to be rolled onto the rolls by gravity from an inclined ramp. Fitting this ramp with a release mechanism permits preloading a number of coils on the ramp at a time, making efficient use of materials handling equipment in the plant and lessening the possibility of a production shutdown while waiting for a coil to be loaded in the cradle. To prevent jarring the coils out-of-round with ramp type loading, the cradle is equipped with a hydraulically cushioned coil catcher to absorb the impact and ease the coil into position.

The cradle illustrated has a capacity of ten tons and will handle stock 72" wide. It is driven by a 10 h.p. motor and has a maximum feeding speed of 100 feet per minute.

PRECISION

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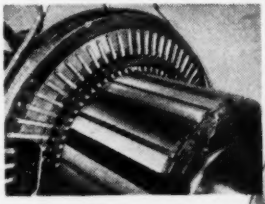
VICTOR BLADES

cut better



Victor Hack Saw Blades are precision made from start to finish. Take toothing. Victor Blade Teeth are always perfectly uniform with no uneven teeth. That's because they're cut by a special machine using scores of *individually* ground toothing tools that are always accurately set. No other manufacturer cuts teeth this way.

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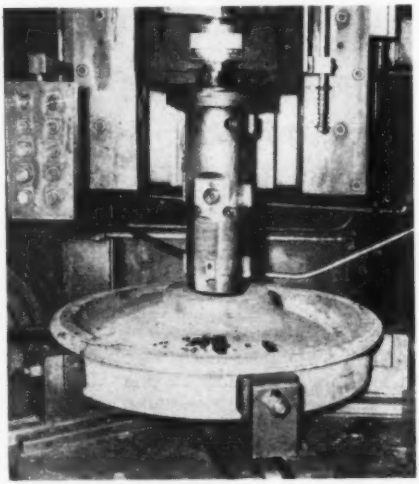
VICTOR

SAW WORKS, INC., Middletown, N. Y., U. S. A.

Makers of Hand and Power Hack Saw Blades, Frames and Band Saw Blades

Car Wheel Boring Tool with Carbide Blades

Micrometer expansion car wheel boring tools equipped with blades of solid tungsten carbide are now offered by the Davis Boring Tool Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. The newly designed boring tool with these blades is stated to offer greater wheel production in railroad car shops, especially where continuous wheel output is required to meet rolling stock needs.



Solid carbide cutters offer unusual advantages for boring both cast iron and steel car wheels. Four cutters are used in rough boring, two in finish boring and a single cutter for chamfering. With the solid carbide cutters, tests show that wheel boring time, in many instances, is reduced from fifteen minutes, where high speed steel or alloy steel cutters are used, to three minutes.

The body of the new Davis boring tool is made of high grade chrome nickel steel and is precision machined throughout. Special attention is directed to the cutter slots which are held to tolerances within .001". Cutter blades are then ground to a .0005" fit in the holders to insure full bearing contact. Metal distribution is designed to reinforce the slots and provide ample backing metal for the cutter holders. This feature insures maximum rigidity and strength and eliminates the possible danger of cutter edge breakdown and crumbling even under the heaviest cuts.

Adjustment of cutters to required bore size is easily made. Through a graduated main screw operating an expanding wedge, cutter movement is controlled within .001". As much as 1⅛" diametrical adjustment is possible. Thus a wide range of bore diameters is obtainable with each size boring tool. As a result, cutters can be rapidly set to meet axle step sizes and, with these tools, holes up to 12" diameter can be bored. The boring machine operator merely reads the number on the axle indicating the turned diameter and then sets the cutters through the micrometer markings on the graduated main screw. Ordinarily this is accomplished by first expanding the cutters to 1/32" less than the required bore diameter. The cutters are then partially locked with eccentric lock screws to provide tension for final setting. This is followed by expanding the cutters to the required diameter and then firmly locking the eccentric lock screws in the boring tool.

Baldor Utility Type Grinder

A new 6" utility type grinder in both ¼ h.p. and 1/3 h.p. sizes has recently been announced by Baldor Electric Co., 4368 Duncan Ave., St. Louis, Mo.

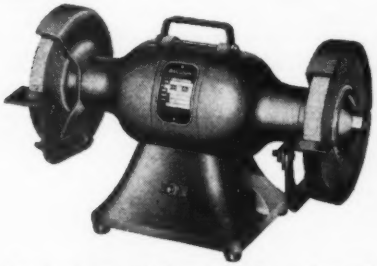
THE CRALEY OFFSET BORING HEADS

Offset boring heads, made in nine sizes, have minimized overhang and easily read calibrations. The boring bars go to the bottom of the dove-tail bearing to make short set-up. Tension screws are on opposite sides and ends of block, so that all cutting strain is thrown against solid metal.

C. C. CRALEY MFG. CO.

SHILLINGTON PENNSYLVANIA

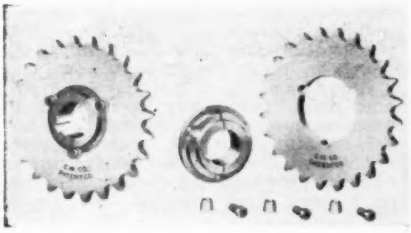
This grinder, designated as 600 Series, has extra wide clearance between the wheels (distance between wheel centers is 13¼"), and the motor frame which permits the grinding of large and odd-shaped pieces. Also, long pieces may be moved across the front of the motor frame because it is smaller in diameter than the grinding wheel. Additional features include a capacitor start, capacitor run motor, 3400 r.p.m., 115 volt, 60 cycle, single phase, guaranteed against burnout for two years; full size ball bearings which require no lubrication; and tool rests which may be tilted for angle grinding.



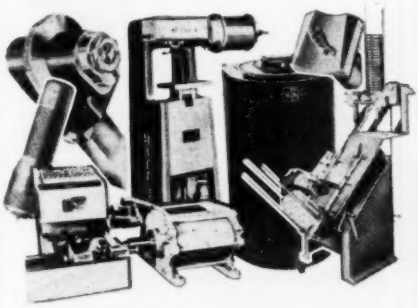
On both the 1/3 and ¼ h.p. sizes, the right hand wheel is 60 grit, and the left hand is 36 grit. On the 1/3 h.p. grinder, both wheels are 6"x¾"; on the ¼ h.p., both are 6"x⅝". Shaft diameters on both models are ½", with an overall shaft length of 16⅛"; shaft length (extended from bearing housing) is 2-1/6".

Interchangeable Hubs for Disc Sprockets

Said by its manufacturer to be unique in design and performance, a new contribution to the power transmission industry, is the Grip-Master, just introduced by the Cullman Wheel Co., 1350-W Altgeld St., Chicago 14, Ill. The idea of interchangeable hubs for disc sprockets has, in the Cullman Grip-Master, been reduced to such simplicity that its wide utility and economy is seen at a glance.



Whether it's Buttons or Battleships



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CENTER DRILLS

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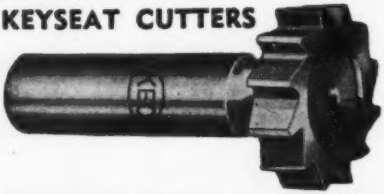
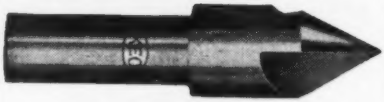
KEYSEAT CUTTERS



High speed. Right hand. ½" shank. Diameter from ¼" to 1½". Standard sizes in stock for immediate delivery. Complete set —41 sizes—available in sturdy, hardwood box. Saves time and money, because you always have the size you need.



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High speed steel. Reamers from ¼" to 1" regularly furnished with 60°, 82°, 90° included angle. Specials made to your specifications.

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Precision made of tool steel, hardened and accurately ground. Tapered .0005" to the inch. Mandrels from 8/16" to 1" are .0005" undersize at small end, from 1¼" to 3", .001" undersize. Immediate delivery.

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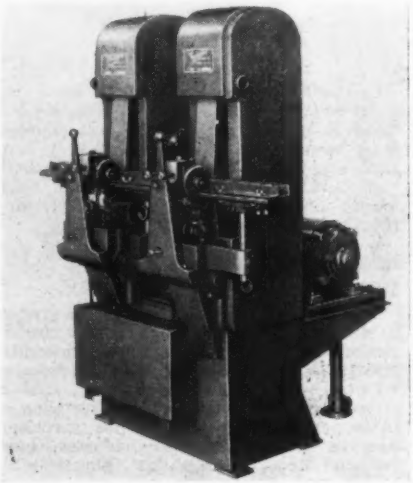
KEO CUTTERS

19326 Woodward - Detroit 3 Mich.

The sprocket plate is placed on the hub, the taper bushings are inserted, head cap screws are tightened and the assembly is complete, ready for mounting on the shaft. Frequently the plate sprockets may be interchanged and mounted without removing the hub. The Cullman Grip-Master is made of steel, bored, drilled and split, ready to receive the plate sprocket. A wide range of sizes is available. The manufacturers claim that use of the Grip-Master is more economical, and that it guarantees a true running assembly.

Production Duplex Polishing Machine

As a result of a continued demand for a fast machine capable of producing a quality finish on small cylindrical work the Four-Eighty-Four Duplex Polishing Machine has been developed by Production Machine Co., Greenfield, Mass. Equipped with two polishing heads this machine employs the use of abrasive, felt, leather or fabric belts depending on the finish desired.



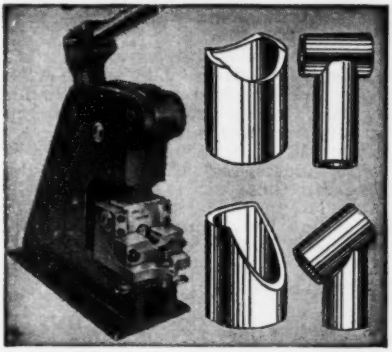
The machine has a capacity up to 1½" diameter; it will perform a two-pass polishing operation on metal, wood, fibre, plastic, fibreglass and many other materials within its weight limitations. Only a single handling of material is required and many parts may be fed to the machine automatically by means of hoppers or fixtures suitable for the individual application. Costs can be reduced upward of 50% on comparative work usually done on a single head machine, according to the manufacturer.

NOTCHING TUBING OR PIPE ENDS EASILY WITH

ARC-FIT

Patent No. 2,126,519

IN POWER PRESS OR HAND PRESS



Arc-Fit is a notching unit for preparing pipe or tubing ends in making welded or brazed tubular joints. Arc-Fit will prepare the ends of a pipe or tube in less than 5 *seconds*. Arc-Fit is a production tool that will cut your production costs. It is applicable in any industry where pipe or tubular construction is used.

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- For sizes over 2", angular cuts other than 90°, and slotting operations. Quotation furnished on request.
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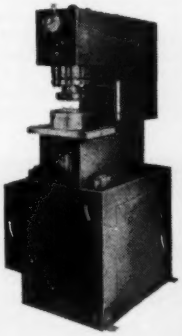
M & N SOLVES A PROBLEM . . . Client Cuts Costs



The U. B. Company (name on request) was producing 30 buffing wheels an hour—using ordinary hydraulic equipment. Consultation with M & N engineers brought about plans and subsequent building of the M & N "C"—Frame press illustrated. HOURLY PRODUCTION JUMPED TO 450 UNITS!

M & N Hydraulic Presses are available from 5 to 75 ton capacity, compactly built and self-contained. Press may be operated manually, by foot, or push button. Double acting cylinder provides power ram return at high speed. This M & N "C"—Frame press features automatic reversal of pressure setting.

M & N Presses are successfully used for drawing, forming, powder metallurgy, silversmithing, punching, stamping, and a wide range of other industrial uses.

DEALER INQUIRIES INVITED

Write today for BULLETIN 102 A

M & N MACHINE TOOL WORKS, INC.

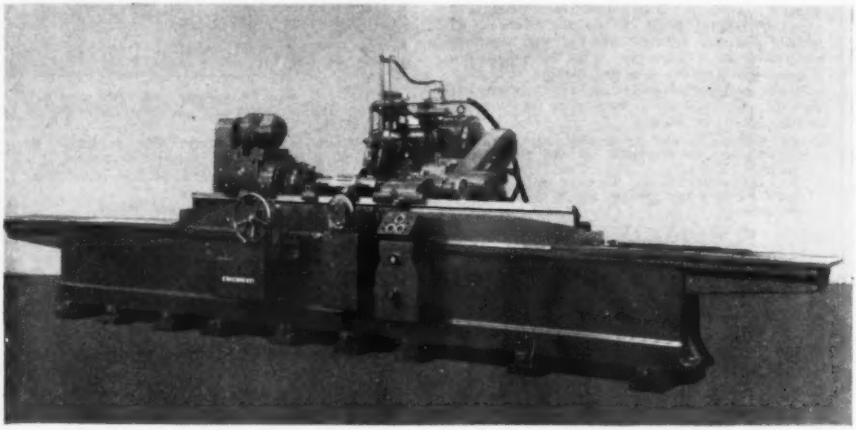
299 ALLWOOD ROAD — CLIFTON, N. J.

Cincinnati Filmatic Plain and Roll Grinding Machines

Three additional sizes have been added to their line of large plain grinding machines and traveling table roll grinding machines, by Cincinnati Grinders, Inc., Marburg Ave., Cincinnati 9, Ohio The new sizes are 16″ Heavy Duty and 20″ and 24″ Plain Grinders; and 16″, 20″ and 24″ Roll Grinders. These sizes round out the Cincinnati line to include both standard weight and heavy duty machines in all sizes from 10″ to 24″ swing.

and eliminating metal-to-metal contact. In addition, Filmatic bearings are self-adjusting for variations in forces created by the grinding action.

A d.c. motor, controlled electronically from an a.c. source, drives the table through a rack and pinion. This type of drive provides dial selection of an infinite number of traverse rates from 3″ to 120″ per minute. To eliminate shock, the table automatically accelerates and



Conforming to other Cincinnati Grinding Machines, the grinding wheel spindle bearings are the Filmatic type. This construction consists of segments which are free to rock slightly in the housing bore, thereby admitting wedge-shaped oil films between them and the spindle journal diameter as rotation occurs. The wedge-shaped films build up to high pressures, supporting the spindle on oil

decelerates at table reversal. No mechanical clutches are employed. Table tarry may be adjusted independently at each end of the stroke. Coolant flow and headstock spindle rotation automatically start and stop with the table traverse, or independently, as desired. All important bearings are automatically lubircated. An individual circulating system supplies filtered oil to the grinding wheel spindle

S&A
SCHULTZ & ANDERSON
dowel pins
Immediate Delivery!
Standard Size Dowel Pins from 1/8" to 1" diameter and from 3/8" to 6" length supplied in .0002 and .001 over basic sizes. Unless otherwise specified, .0002 oversize will be furnished.
Dealer inquiries invited.
SCHULTZ & ANDERSON CO.
111 EDISON PLACE NEWARK 5, N. J.

bearings. A second circulating system automatically lubricates the table and cross ways with EP oil.

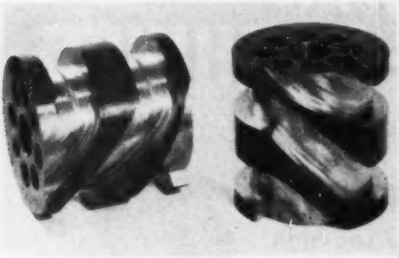
The headstock is a dead spindle, d.c. motor driven unit, having a speed range of 20 to 72 r.p.m. for the 16″ size, and 15 to 54 r.p.m. for the 20″ and 24″ sizes. The taper hole in both headstock and footstock spindles is No. 15 B & S.

A wide selection of extra equipment is available for these machines, including Automatic Wheel Balancing and Hydraulic Profile Wheel Truing equipment. The roll grinding style includes power cross feed to the wheelhead, and the tilting wheelhead type roll cambering mechanism. Adjustment for the amount of camber is obtained through a double eccentric and charge gear arrangement.

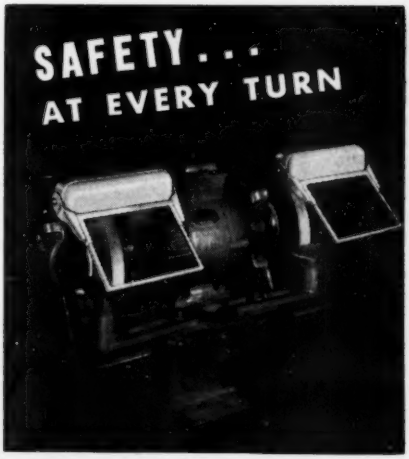
Plain machines are built in seven lengths at two-foot intervals, from 48″ to 192″, while the roll grinder style is built in the same lengths up to 168″. Principal power requirements are 20 h.p. for the wheelhead motor; 2 or 3 h.p. for the headstock motor; 1½ h.p. for the table drive motor.

Schlecht Offers Variety of Cam Manufacture

The barrel cam illustrated below, measuring 6″ in diameter, 6″ high, and with a 1½″ groove, is only one selected atrandom from the hundreds which are manufactured by L. G. Schlecht & Son, Inc., 1626 N. Astor St., Milwaukee 2, Wis. According to this firm, which has specialized in cam manufacture for 25 years, no cam is too large or too intricate for their specialized staff and equipment.



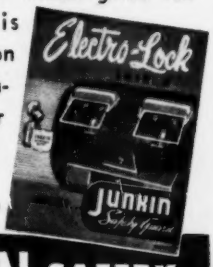
Cams can be made to hold to the most exacting accuracy, supplying the answer to every cam need. L. G. Schlecht & Son state that they can produce one cam—and supply an exact duplicate at any future date—or a large quantity on a production basis. The firm suggests that interested plants send blueprints or let Schlecht engineers help in the development of cam movements.



WITH THIS NEW

ELECTRO-LOCK SAFETY SHIELD

Another Junkin device that actually ENFORCES safety, because grinder can't operate until shield is in position. Write today for our new booklet which gives full details of this latest protection against the dangers of grinder operation.



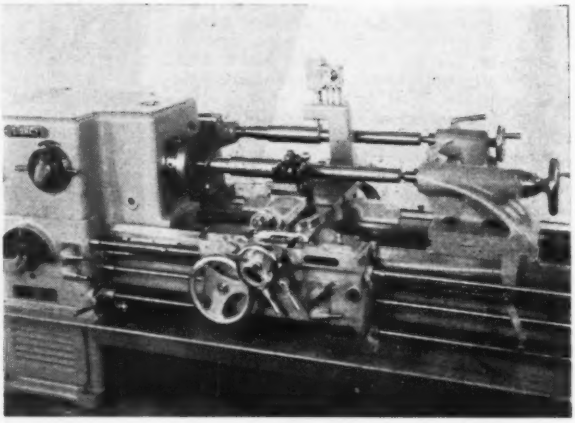
ANOTHER...

JUNKIN SAFETY GUARD

JUNKIN SAFETY APPLIANCE CO., INC.
930 W. HILL ST. LOUISVILLE, KENTUCKY

The Sidney Fluid Tracer

The Sidney Machine Tool Company, Sidney, Ohio, has announced the availability of the new Sidney Fluid Tracer for use with all models of Sidney Lathes. The Fluid Tracer as illustrated at the right, is applied to a standard lathe to serve the dual purpose of tracing from a master, as well as regular lathe work without limiting the capacities of either, thus eliminating the necessity of having a single purpose machine. Conversion from tracer control to regular lathe control is made simply by the movement of one lever located on the front of the clutch and brake unit. There are no parts to put on or to take off when a change-over is necessary from tracing to standard lathe operation. The regular compound and cross feed assemblies are used and are directly connected to a hydraulic cylinder mounted at the rear of the carriage in the same manner as the standard taper attachment bracket, and do not require a special fixed angle rest to reproduce a sharp right angle.



The compound rest can be swivelled

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American DRILL JIG
BUSHINGS
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EXCLUSIVE DISTRIBUTORS IN EVERY MAJOR LOCATION THROUGHOUT THE U.S. AND CANADA CARRY ALL SIZES IN STOCK FOR IMMEDIATE FREE DELIVERY. YOU ARE ASSURED OF
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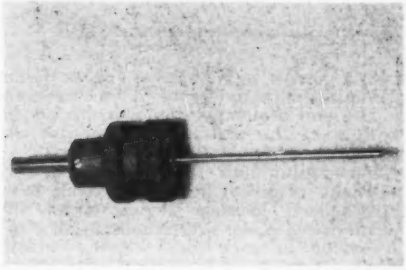
to any desired angle for turning or boring, and both the top slide and cross feed dial can be used for the setting of the tool to the desired depth of cut. If round templates are to be used, the master piece can be machined in the regular manner and then be used as a template. Longitudinal adjustment to the master can be made by the auxiliary tailstock centers. The center on the auxiliary tailstock nearest the headstock is spring loaded, thus eliminating the necessity of re-setting the cutting tool for close adjustments.

The tracer head is furnished with a three-way valve control for forward and reverse rapid traverse and feed to the cross slide. The rate of cross feed is controlled by the valve mounted on the front side of the tracer head and the direction of traverse by the lever on the front of the carriage. The tracer head has two functions—it controls the cross movement of the tool as well as the hydraulically operated clutch and brake mechanism located at the tailstock end of the bed. The function of this clutch and brake mechanism is to synchronize the longitudinal movement of the carriage with the rate of cross slide travel and also to by-pass the flow of oil when the lathe is used for regular lathe work when the tracer is not in use.

Nobur Tools Deburr Smaller Holes

To meet an increasing demand for tools of smaller pilot size for deburring and chamfering holes as small as ⅛", Nobur Manufacturing Co., 717 N. Victory Blvd., Burbank, Calif., has developed its new "DS" Series Tools. These new tools are available for fast, efficient deburring on ⅛", 5/32", 3/16" and .189" holes.

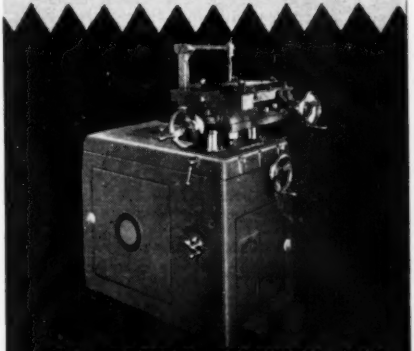


The new Series "DS" will operate in any drill press or power spindle. A free wheeling knurled sleeve is actuated by the operator—while the spindle continues to rotate—to project the cutting blade to

CUT time and Costs

WITH THE

ELECTRIX PRECISION DIE MILLER



The ELECTRIX PRECISION DIE MILLER is designed to mill inside and outside shapes such as blanking dies, draw dies and cams. Milling of complicated die and cam outlines is reduced to minutes with the ELECTRIX PRECISION DIE MILLER. Actually see complicated outlines milled in MINUTES — NOT HOURS. Inverted infinite speed precision spindle sealed for life bearings — Counter balance fly wheel—assuring smoother finish and longer tool life.

For Particulars Write

ROLL FEEDS CORP.

PAWTUCKET . . RHODE ISLAND

Builders of "RFC" Roll Feeds

PLYMETAL BRAZING SHIMS
for *CARBIDE TOOL TIPS*

In
- **SILVALOY #2501 and**
- **SILVALOY #5031**

Silvaloy No. 2501 and No. 5031 are clad materials furnished in three thicknesses:
.020 thick consists of .010 copper center—clad both sides with .005 Silvaloy No. 2501
.011 thick consists of .005 copper center—clad both sides with .003 Silvaloy No. 503
.016 thick consists of .008 copper center—clad both sides with .004 Silvaloy No. 503

Each of the alloys are furnished with or without radius, square or rectangular, Pentagon shape 80 degree with radius, Pentagon shape 60 degree no radius, triangle, circles, etc. Available in all standard tool sizes.

Shims are also available in Silvaloy No. 503, No. 2501, Constantine and Copper.

STEEL SALES CORPORATION
3348 So. Pulaski Rd., Chicago 23, Illinois
Bishop 7-7700

STANDARD D-4 Abrasive Band Grinder

Famous for Stamina

This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood 4x36¼" band. The ideal portable unit.

OTHER STYLES AND SIZES IN NEW MANUAL ON FINISHING—WRITE TODAY

WALLS SALES CORP.
333 Nassau Avenue, Brooklyn 22, N. Y.

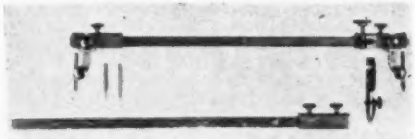
working position and to retract it within the diameter of the pilot shaft. This enables the cutter head to be brought into otherwise inaccessible areas of multi-walled parts.

The cutter blade is rigidly supported by the pilot shaft, providing the necessary support against blade deflection. In addition, in its projected position the blade is firmly locked in place by engagement of a pin within a slot in the body of the shaft, affording further rigidity.

The new "DS" Series Nobur Tools supplement the existing sizes of tools made for deburring and chamfering larger size holes. The DS 3/16" and No. 10 (for .189" holes) duplicate sizes offered in the standard series "AS" Nobur Tools, and are recommended where heavy burr-removing operations are encountered, or for applications on tough steels.

Velox Precision Beam Compass

The V. & E. Manufacturing Co., 758 S. Fair Oaks Ave., Pasadena 20, Calif., announces a new beam compass for speeding up large-scale precision drafting. This beam compass is useful for the heavy-duty service of the modern all-pencil drafting technique; for precision inking; for scribing on tool steel and other metals. The beam has a 4-inch rack for slow motion micromatic adjustment. It is of hard-rolled structural aluminum alloy and is supplied in lengths for radii of 8¼" or 12". The beam has a ¼-inch square cross section and can be coupled to Vemco beam extensions, or to stock bars of aluminum, brass, or steel, for radii up to six feet. The illustration

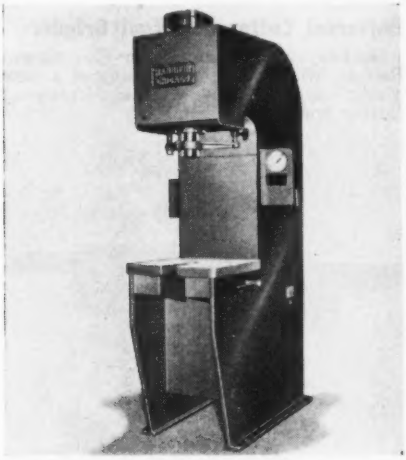


below shows a No. B-440 Velox Beam Compass; directly below it, at the right is the pen attachment; the device at the bottom of the picture is the beam extension.

The sliding legs fit the beam loosely to make possible the use of stock bars, but special locking devices twist the beam in the slides and eliminate all play. A spring in each lock insures smooth sliding action and protects the beam against marring. One leg is moved along the beam by a rack and pinion for exact settings; results of turning the slow motion pinion screw are evident at a glance and are definitely predictable.

10-Ton Hydraulic Forcing Press

Hannifin Corporation, 1130 So. Kilbourn Ave., Chicago 24, Ill., offers their new 10-ton hydraulic forcing press, Model F-101. The new design is built to the high Hannifin standards, including proper rigidity of frame, precise machining of the cylinder and ram, and controls that are easy to operate.



The F-101 is floor mounted, with an 18"x20" table, 36" above the floor. Standard models have a 3-inch "U"-slot in the table. The gap or "daylight" is 22"; the reach is 10"; and maximum stroke is 12". Completely self-contained, with a 5 h.p. vertical motor and an 11 g.p.m. constant volume pump, the press has an adjustable relief valve which enables the operator to set maximum pressure at any point from 10% of capacity to full, 10-ton capacity. The ram is guided to prevent rotation and the return stroke is adjustable, so that cycle time can be reduced considerably on applications where the full stroke is not needed.

The single manual lever control—"handle down, ram down; handle released, ram up"— is standard, but dual manual lever control and the manufacturer's patented Sensitive Pressure Control are both available. A differential circuit which doubles the approach speed without limiting feed pressure or return speed may also be had. These extras can be added without materially increasing the delivery time, the manufacturer states.

FEEL THE POWER

-Don't Carry It!

with the ¾ H.P.

Mallflex GRINDER

There's *No Motor to Handle!*

7 ft. all-metal flexible shaft connects light weight working tool to motor which is mounted on smooth rolling pedestal or overhead trolley. Operator grinds, wire brushes, sands, polishes **without having to carry the motor!** This permits a more powerful motor with more copper and iron to prevent "burnouts" on overloads. Heavy duty motor operates from 110/220 V, 60 cycle single phase AC circuit.

37 Factory-Owned Service Stations from Coast to Coast provide immediate, dependable repair service. A dealer in any town can supply you. **Write Flexible Shaft Division for FREE demonstration in your plant, illustrated circular.**

MALL TOOL COMPANY

7742 South Chicago Ave. • Chicago 19, Illinois

Pre-Wired Control Panel for Temco Electric Furnaces

Installation of the Temco line of electric furnaces is simplified by a new wired control panel which attaches to the furnace body. The panel is available with several sizes of furnaces and houses

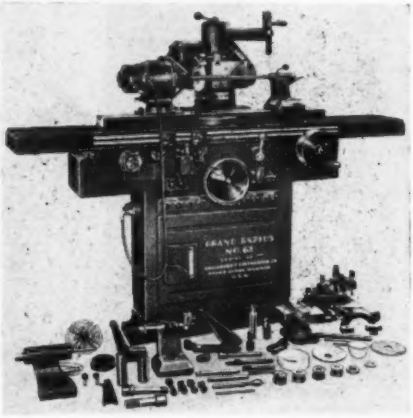
the temperature controller together with the load carrying relay, thermo-couple lead and fused disconnect switch. Electrical wiring of all these parts is complete, it being only necessary for the user to attach the panel to the furnace with screws provided and make two simple connections to the furnace and one to the electric line. The Temco line is made by Thermo Electric Mfg. Co., 486 W. Locust St., Dubuque, Iowa.

Either a fully automatic electronic pyrometer-controller, or a manually operated controller-indicator may be used in the control panel. The electronic controller permits pre-setting the control for the required temperature which will be automatically attained and maintained, while the manual control allows the operator to regulate the temperature by manual adjustment of the control knob.

Several improvements have also been made in the construction of the furnaces themselves, including more efficient insulation and improved design of the heating elements for faster, more efficient heating. This equipment is available in various sizes and is designed for hardening, drawing, annealing, pre-heating for high speed hardening and general laboratory work requiring temperatures up to 1900° F.

Universal Cutter and Tool Grinder

Gallmeyer and Livingston Co., Grand Rapids, Mich., has just announced a new motor driven Power Feed Universal Cutter and Tool Grinder.

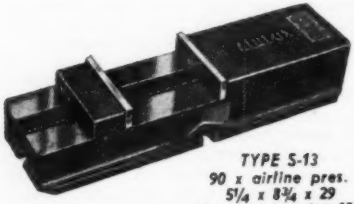


The table of this new model 62 is 6" wide x 42" long with a single 9/16" tee-slot running its entire length. This machine will swing work up to 12" diameter, takes 28" between work head center and tailstock center and has a longitudinal table movement of 24".

AIRLOX

PNEUMATIC VISES

Five senior models. Many special-purpose construction. 50 to 200 times airline pressures. *Write for data sheets* • Wedge-&-lever action utilizes total cylinder drive. Pat'd. Exceptional rigidity particularly suited to work-holding on CARBIDE MILLING, and almost all milling operations.



TYPE S-13
90 x airline pres.
5¼ x 8¾ x 29
Max. jaw opening 12"

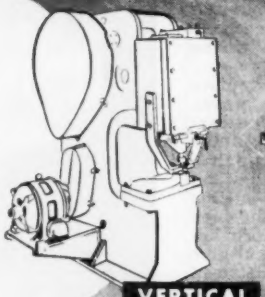
production devices, inc.

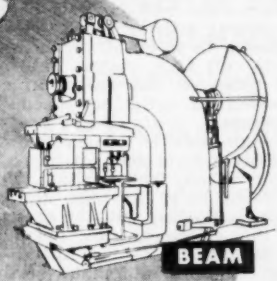
Whitehall, New York

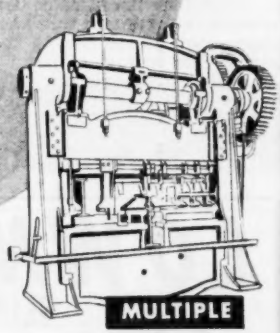
THE TREND IS TO THOMAS *in Punches*

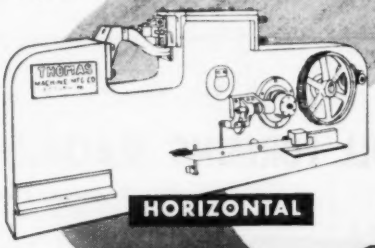
Made in a wide range of capacities to serve your most varied punching needs.

Send for bulletin on type you require.


VERTICAL


BEAM


MULTIPLE



HORIZONTAL

THOMAS
MACHINE MANUFACTURING COMPANY
PITTSBURGH (23), PA.

24

PUNCHES • SHEARS • PRESSES • BENDERS • SPACING TABLES

The new unit is a cabinet base machine provided with such features as an anti-friction ball bearing table with the ball bearings carried in a micarta track, the raising and lowering of the grinding wheel head and the cross feeding of the head and column so that the sub-table and table remain fixed as to vertical or transverse movement. (This fixed table allows the operator to stand up close to his work, and also means that the weight of the attachment and the work is carried directly over the base.)

The Bijur one-shot lubrication system, plus grease-sealed ball bearings on all rotating shafts, and greased-for-life, dust-tight, cartridge-type precision ball bearing spindle, eliminates time down for lubrication while insuring proper lubrication of all moving and friction parts.

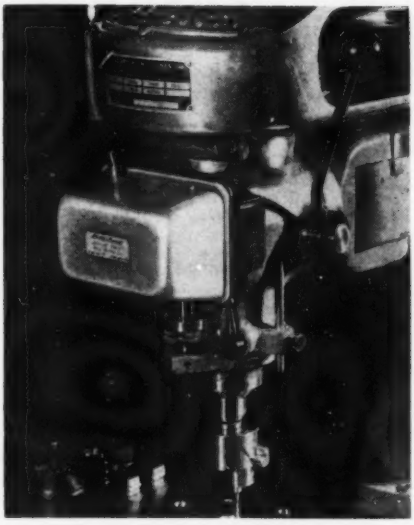
Guarding against grit and dirt getting into the bearings, the vertical movement of the machine has dove-tailed ways on the two sides of the raising and lowering column. The column is protected from grit and dirt by telescopic guards.

Automatic Boring Unit Has Wide Adaptability

The Acro-Bore Boring Unit, just introduced by Skyline Tool & Gage Co., 4127 Newark Ave., Cleveland 7, Ohio, has been designed primarily for use on the Bridgeport Boring Head, but can be adapted to other boring heads with special brackets. The Acro-Bore unit consists of a gear-motor drive, fully encased, electrically controlled with an on-off switch, powered by a 110 volt f.h.p. motor. The operator simply plugs in the extension cord in any convenient outlet; no special wiring is necessary.

The Acro-Bore is designed to replace the old style hand feed. It has a steady feed rate on any belt position. The unit feeds down only; to raise the spindle for each succeeding cut, the operator releases the clutch on the machine and raises the handle to the initial cutting position. This new automatic boring feed is claimed to bore faster and more accurately, to maintain tolerances, and give longer tool life to boring tools between grinds. The tedium of hand feeding and the problems of operator fatigue on production runs is eliminated.

The rugged construction of the unit insures a long service life and eliminates vibration. The feed rate of this unit is



LOWN . . . . . .

SLIP ROLL FORMING MACHINES

Model B-400
4" diameter

• Initial Type-Power Driven. • Rolls 4" diameter. • Oilite bearings - Alemite lubrication. • New type quick acting latch on drop arm. • Hand wheels on adjusting screws. • Roll position indicators. • Fast, sturdy and easy to operate. • Prompt Deliveries.

• Other size machines also available.

Write for Bulletins

Distributors in Principal Cities

SAN ANGELO FOUNDRY & MACHINE CO.

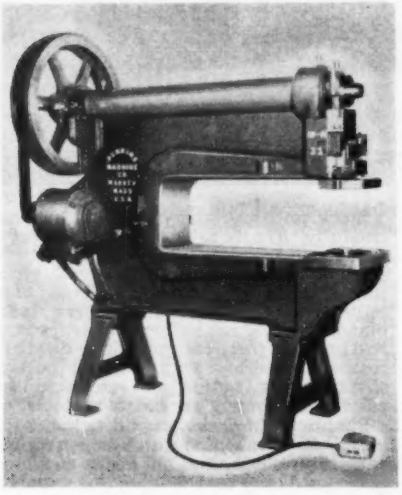
San Angelo, Texas . . . . . **1000 E. Upton.**

approximately 7/16" per minute; the size is 2¾" x 3⅞" x 5½"; it weighs 3¼ lbs. It may be easily attached or removed in 30 seconds. Attachment to a Bridgeport Boring Head is made by removing two nuts on the head, and attaching the unit by the same two nuts.

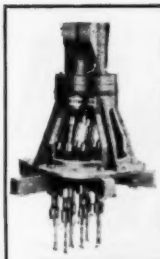
Perkins Special Purpose Presses

Two new extra-capacity, special purpose presses have recently been announced by Perkins Machine Co., Warren, Mass. In their design, special attention has been paid to versatility, economy of operation, low upkeep cost, convenience of operation and accessibility of dies for quicker changes, the manufacturer states.

The new Perkins No. 201-S long-stroke press has an effective stroke of 7" and a throat clearance from the bed to the ways of 21". It is designed for easier and faster changing of dies. The column is tilted back for more convenient operation. It is provided with a back gear drive powered by a 1 h.p. motor.



The new Perkins No. 10-M-32 (illustrated), is a deep-throated press designed for higher production on a wide variety of work where extra throat capacity is required. Its accessibility to all moving parts and to the dies as well as its simplified, rugged design make it a production tool and an economical press to operate. This press is equipped with a flywheel type of drive, actuated by a 1½ h.p. motor.



FULL BALL BEARING
Completely Adjustable
UNIVERSAL JOINT
DRILLHEADS
STANDARD *Only* with
THRIFTMASTER

Full Ball Bearing construction coupled with Thriftmaster design and manufacturing dependability, assures smooth, steady, positive drillhead performance that will last!

THRIFTMASTER UNIVERSAL JOINT DRILLHEADS
2 to 10 (or more) Spindles.....Capacity to ⅞" in Cast Iron 6" to 10" (or larger) Circle

OTHER THRIFTMASTER PRODUCTS
Special Fixed Center and Standard Eccentric Adjustable Drillheads.
Multiple Spindle Automatic Reverse Tap or Drill Attachments.

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STANDARD UNIVERSAL ADJUSTABLE AND SPECIAL FIXED CENTER DRILLHEADS

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COOLING
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COOLS HOT BEARINGS QUICKLY

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about the manhours lost when fasteners aren't accurately made. That's why

Wm. H. Ottemiller Co.

of YORK, PENNA.

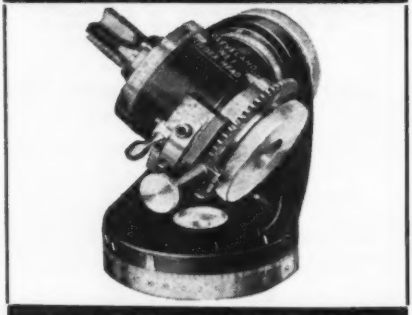
has acquired such a reputation for making the finest in:

CAP SCREWS | SET SCREWS | COUPLING BOLTS | MILLED STUDS

Next time you order—be wise—

SPECIFY Ottemiller

TOOL HOLDER INDEXING HEADS



Holds 1/16" up to 1½" Tools 5C or 1AM Collets and Brown & Sharpe or Morse Taper. Will adjust to any compound angle.

GRINDERS & FIXTURES INC.

8327 Clinton Road Cleveland 9, Ohio

P & W Cutter and Radius Grinder

Designed to grind an infinite variety of milling cutters, end mills and other tools, this new Cutter and Radius Grinder has wide application in tool, die and machine shops, Kellering shops, metalworking and plastics plants, and other locations where accuracy and sharpness of cutting tools must be maintained. It is a recent development of Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn.

Stock and special tools which are successfully ground from the blank or sharpened on this machine include: die sinking cutters; end mills of all types; thread milling cutters; staggered tooth mills; Keller cutters and tracers; lathe, planer and shaper form tools; special indicator points; profiling cutters; reamers; inserted tooth milling cutters; slitting saws; radius and angle milling cutters; and many special form tools.

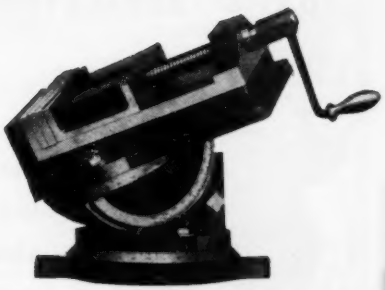
Simplicity of design is said to make this new P & W machine quick to set up and easy to use. Longitudinal slides and cross slides on both the work holding unit and the main spindle assembly, plus a vertical slide on the latter, provide exceptional maneuverability. All movements are governed by positive stops and locks.

Provisions are made not only for conventional straight and spiral teeth, but for the various combinations of radii, angles and spirals encountered in die and mold-making cutters. The work holding unit is mounted on a graduated swivel base which enables the operator to blend

SAVE TIME on intricate, angular SET-UPS

with the

Master Multi-Swivel VISE



Fully universal . . . 3 swivels simplify setting of compound angles. Parts interchangeable. . . . Can be used as a plain flanged vise, swivel vise, multi-swivel vise.

Optional Accessory

Platen, interchangeable with vise. Increases capacity of unit. Uses: as plain platen, multi-swivel platen.

write DONOVAN MFG. CO. 80 Batterymarch St., Boston, Mass.

ball-nose and radius-nose grinds into perfect tangency with the side teeth of an end mill without difficulty, and to produce draft angles on straight or spiral flutes.

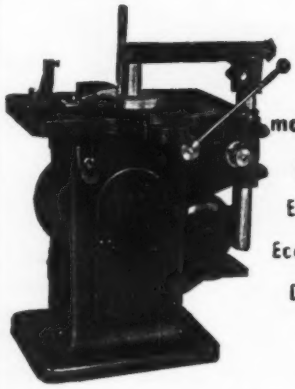
The P & W Cutter and Radius Grinder is available in two types, the R-6, having a flute length capacity of 4½", and the R-8, which will accept flutes up to 10" long. The R-8 will accommodate Brown & Sharpe taper shanks up to No. 12. The R-6 will take up to No. 9 B & S as regularly equipped, and with additional equipment will also accept up to No. 12.

Sensitive Electric Rotary Actuator

Airborne Accessories Corporation, 25 Montgomery St., Hillside 5, N. J., announce their Models R-430 and R-440 "Rotorette," which were originally developed for a production Air Force fighter plane and which are adaptable to valve operation and similar applications. Weighing approximately one pound, these actuators are equipped with load-limiting switches which may be adjusted to any value up to 50 pound-inches. The motion between travel limits is controlled by adjustable positive stops which cause a reaction on the load limit switches.

The Model R-440 is similar to the R-430 except that provisions are made for a position-indicating potentiometer or intermediate position switch where either feature is desired. Both units are designed to meet AN-M-40 requirements, including radio noise and integral brake, and are among the most compact aircraft actuators meeting all AN requirements.

"DAVIS" KEYSEATERS



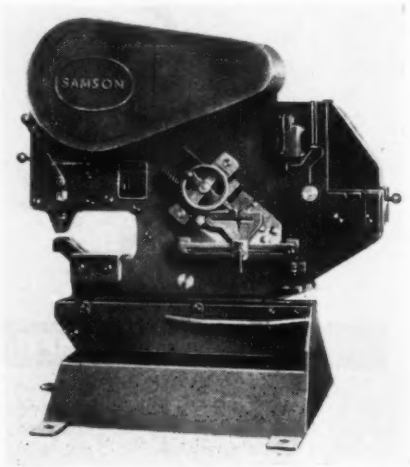
are moderately priced Efficient Economical Durable

Built in 3 sizes for cutting keyways 1/16" to 1" width. Circular upon request.

DAVIS KEYSEATER CO.
407½ Exchange St. Rochester 8, N. Y.

Blum Samson Universal Fabricator

A new unit of metalworking equipment called the Samson Universal Fabricator has been introduced by Julius Blum & Co., Inc., 532 W. 22nd St., New York 11, N. Y. This ingenious machine is equipped to perform a number of operations. The punch will handle webs and flanges of beams, channels and columns, as well as angles and flat stock.



The shear cuts plates and sheets of any length or width and trims angles. The bar cutter cuts rounds, squares, angles and tees, the latter either straight or on a mitre up to 45°. A built-up coper-notcher on the shear end is suitable for V-notching on angles and tees, as well as coping structural shapes and plate.

The machine is available in three models—No. 10 (iilustrated), No. 13 and No. 16. Capacity of the punch in each model is ¾" round x 7/16", 1" rd. x ½", and 1⅛" rd. x ⅝", respectively. Capacity of the shear in each model is ⅜", ½" and ⅝" in plates, and ½", ⅝" and ¾" in flats. The bar cutter has a capacity of 1-3/16", 1⅝" and 1⅞" in rounds, and 1", 1⅜" and 1¾" in squares.

The frame of the Samson Fabricator is of unbreakable steel plate construction. The punch can be lowered by hand lever for accurate centering. Two interchangeable die blocks enable the punch to handle a wider range of shapes. A one-shot central lubrication system is standard equipment. A complete set of guards for gears, belts and flywheel is

No More Guessing . . . accurate Torque Control

No Friction Adjustments Moving Parts Fragile Mechanisms

More Accuracy — Permanently Accurate—Closer Product Quality Control
Tool Life — Lower Tool Cost
Speed — Lower Assembly Cost Per Unit

Guessing How tight threaded fasteners are.
Use a Sturtevant permanently accurate torque wrench to obtain product quality control and thus insure field performance and product reputation. Write for Bulletin—SW15.

P A STURTEVANT CO
ADDISON QUALITY ILLINOIS

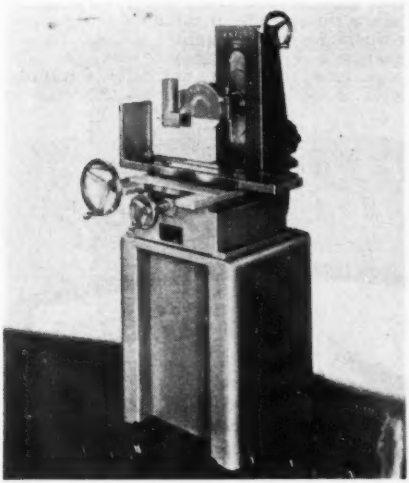
included. A swing-away punch stripper, quick-adjustable bar cutter stripper and shear hold-down are among the time-saving devices built into the construction of this machine.

Sanford Improved Surface Grinder

A block, die, part or unit up to 12″ high may be finish ground with a 7″ diameter wheel in the improved Model MG Surface Grinder offered by Sanford Manufacturing Co., 1020-62 Commerce Ave., Union, N. J.

Meehanite castings have been used to give this improved machine extra strength and rigidity. Each machine is built to close precision, and is carefully checked to grinding accuracy up to .0002″, even at extreme positions.

"V" type slides, ground and lapped, are used instead of flat surfaces and each surface is carefully hand tooled for complete positive lubrication and sensitive movement.



This improved grinder stands 65″ high including floor base and requires floor space 45″ wide x 45″ deep including motor and mounting. The traverse movement is 8¾″ and longitudinal 13″; the vertical movement is 12″.

Standard equipment includes dynamically balanced 110/220 volt a.c. single phase, 60 cycle motor, approved control, wheel adapter, dust guards, exhaust guard, grinding wheel and wrenches.

WHEN ACCURACY COUNTS...

Contact SCHERR!

The MAGNI-RAY
The Illuminated MAGNIFIER for Precision Inspection

• OBLIQUE RAYS MAKE SCRATCHES AND DEFFECTS STAND OUT CLEARLY
• GENUINE OPTICAL GLASS LENSES
• HEAVY ADJUSTABLE BASE
REMOVABLE LENS HOUSING FOR INSPECTION OF LARGE SURFACES, ENGINES, ETC...

MODEL "A"	3" LENS	$ 21.65
MODEL "B"	2" LENS	29. •
MODEL "C"	5" LENS	34. •
MODEL "CA"	5" (FLUORESCENT LIGHT)	40. •

WRITE FOR ILLUSTRATED FOLDER

George Scherr Co., Inc.
Complete Line of Precision Instruments
198 LAFAYETTE ST. • N.Y 12, N.Y.

PORTABLE
ELEVATING TABLE

Saves TIME and LABOR

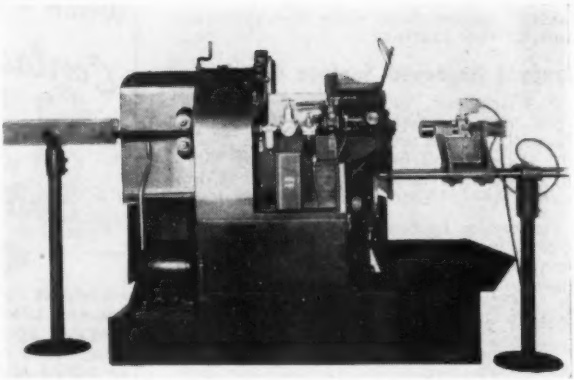
Eliminate heavy lifting and cut handling costs. Slight foot pressure varies height up to 15½", leaving operator's hands free. Table swivels and locks in any position.

SEND TODAY FOR ILLUSTRATED CATALOG NO. 2

MIDWEST TOOL & ENG. CO.
112 WEBSTER ST., DAYTON, OHIO

Modern Automatic Cutting-Off Machine

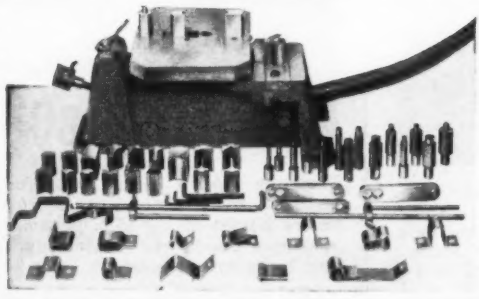
The Modern Automatic Cutting-Off Machine for cutting off tubing, pipe and bar stock, is a development of Modern Machine Tool Co., Jackson, Mich. The machine is available in two capacities—the No. 2 for tubing and bar stock from 0" to 2" o.d., and the No. 3 for material of ¼" to 3" o.d. The unit is provided with an automatic cycle which is actuated by air cylinders with hydraulic control for the cutting tools, or by all-hydraulic control.



All machines are operated by direct drive from motor to spindle. The spindle speeds and motor requirements on the No. 2 machine are 350, 514, 748 or 1055 r.p.m., driven by a 3 h.p., 1800 r.p.m. motor; for the No 3 unit, spindle speeds are 218, 288, 374, 504, 647 r.p.m., with a 3 h.p., 1200 r.p.m. motor. The feed and compound pumps are driven by two v-belts from a separate ½ hp. 1200 r.p.m. motor.

The machines are furnished with front and rear cross slides, both set at a 30° angle. The rear cross slide is set above the spindle; the front cross slide is set below the spindle; it carries a tool holder, adjustable for height, which rigidly clamps a ⅛" x 1" bevel tool bit. The rear cross slide is normally equipped with a ½" square tool bit for use in

THE MULTIFORM Bender



NO SPECIAL TOOLING

Bends & Cuts — Flats — Rounds Into Any Shape — Brackets — Clamps — Bus Bars — Springs — Wire Forms — Aircraft Work — Steel Rule Dies, Etc.

Hand or air models, profit producers in any plant also larger models for up to ¼" x 4" material.

J. A. RICHARDS CO.
DEPT. 5B, KALAMAZOO, MICHIGAN

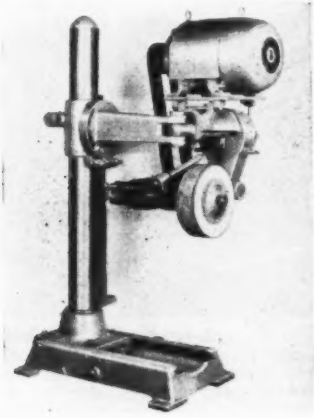
burring, chamfering or turning while the cut-off is being made by the front tool.

The cross slides are operated from the large rocker arm with adjustable cams. This rocker arm is actuated by a special double air-hydraulic cylinder. Air enters the lower end of the lower cylinder and the upper end of the upper cylinder. These two cylnders are mounted on a common head; hydraulic oil is placed in the upper part of the lower and lower part of the upper cylinder. The common head is provided with check and regulating valves.

Standard equipment for the Modern Automatic Cutting-Off Machines includes a roller stock feed, stock stop, pump and piping for cutting lubricant, one collet (any size), one guide bushing (any size, for guiding the stock through the spindle), stock trough support standards, all valves and cylinders, and wrenches.

Compact Polishing and Buffing Head

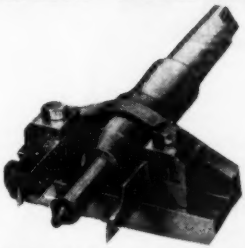
This new, universal polishing or buffing head is designed to meet the need for a compact unit which economizes on floor space but provides extreme versatility in use. It is introduced by the Murray-Way Corp., 3925 W. Fort St., Detroit, Mich.



The new head, designated as the 60 Series, will be made available in two standard sizes; Number 61 is rated at 10 to 15 h.p., and Number 62 is rated at 5 to 7½ h.p. Both units will be of substantially the same design and features.

The new heads will operate either right or left hand, without extra brackets or extensive mechanical adjustment. A simple change-over can be made quickly.

SOMETHING NEW UNDER THE SUN



Finished holes 1½" to 11¾" diameter to a depth of 8" in one rapid operation on your present equipment

with

THE BOREMASTER

Not just another Trepanning Cutter but a real heavy duty tool. Stock removed in one piece eliminating waste.

TIME SAVINGS + MATERIAL SAVINGS = COST SAVINGS

For full details write

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Hammond's OF KALAMAZOO

Model "400"

HORIZONTAL or VERTICAL

4" ABRASIVE BELT GRINDER

Eliminate costly hand filing, grinding, deburring and many other operations . . . There are "101" applications for the 400 in your plant. Write for bulletin.

Hammond Machinery Builders

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.001" and
0.1 mm vernier

THE HELIOS

Guaranteed Accuracy

$8.75

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Importer and Mfrs. Agent

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NIELSEN

Heavy Duty

Live Centers

Write for catalog on live centers

Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

NIELSEN, INC. LAWTON, MICH.

Because of their compactness, the new heads will operate on three-foot centers, thus greatly reducing the required diameter of dial-tables and permitting substantial economies in the length of conveyors and the number of fixtures required. Special pneumatic controls assure constant, accurate work-pressure, automatically.

Reed Cone Rolling Machine

A new unit which is designated by its manufacturers, Reed Engineering Co., 1003-17 W. Fairview Ave., Carthage, Mo., as a Cone Rolling Machine, is built expressly for rolling and forming of cones and conical shapes. It is currently being used in the jet engine program.

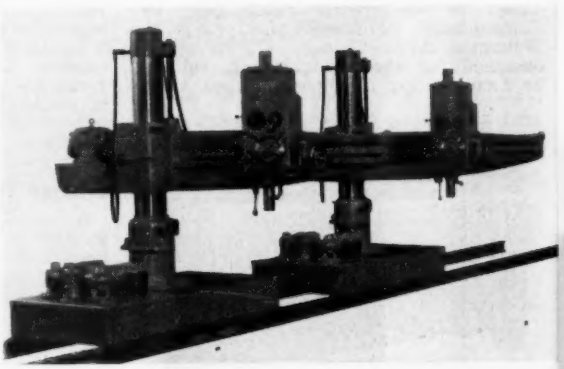
This machine employs three conical-shaped rolls mounted in a cantilever design, and is built for producing cones and conical shapes to almost a complete point at the small end. Each of the three machine rolls is driven by an independent motor and each roll is also adjusted independently by separate adjusting motors.

Due to the universal adjusting features utilized in this machine, the rolls can be set for any position from full parallel up to a 45° included angle. The actual forming rolls are of the interchangeable type and can be readily changed from the front of the machine.

One set of forming rolls normally handles a wide range of cones, although for high production work and extreme accuracy, individual rolls for each type cone are recommended. The machine measures approximately 8′ x 8′ x 8′ in size; the shipping weight is approximately 13,000 pounds.

Cincinnati Radial Drills with Traveling Base

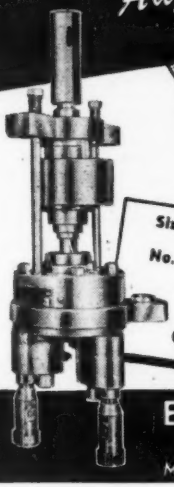
Improved flexibility is offered by the new track-mounted radial drill recently announced by Cincinnati Gilbert Machine Tool Company, 3366 Beekman St., Cincinnati 23, Ohio. The base, 46″ wide by 90″ long, will ride on standard Cincinnati Gilbert horizontal boring mill runways or 100 pound rails. The gauge is 3 feet. The unit carries, completely enclosed, all the necessary power and electrical equipment. Traversing, clamping and coolant pump controls are mounted on the base and duplicated on the drill head for the operator's convenience.



Power traversing and clamping equipment is optional. Under power the unit traverses at a rate of 50 feet per minute. The traversing mechanism consists of a 1½ horsepower, 960 r.p.m. motor (adaptable either to a.c. or d.c. sources), a reversing control, worm-driven speed reducer, and heavy bevel gears for the final drive to one axle. Both axles rotate in Timken tapered roller bearings, and all mechanism operates in oil or is permanently lubricated.

The clamps, located near each wheel, hold the drill during operation. The clamping motor is equipped with a suitable reversing starter.

Only ERRINGTON Adjustable TAPPING HEAD Offers So Many Advantages



- Fully geared
- Needle bearings on all spindles in head
- Ball thrust bearings throughout
- Bronze bushed
- Sand cast aluminum case
- All parts fully enclosed for pressure lubrication and protection
- Non-slip positive clamping on all adjusting members

Sizes: #0 - #10 Tap to 5/16"
#1 - 3/16" Tap to 1/2"
No. Spindles: 2 to 6

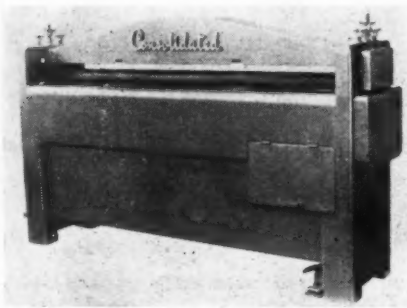
Here's a versatile tool which permits you to take advantage of a wide range of adjustment — without overhang. Supplied with 3 spindles for equal adjustment in line and 3, 4, 5 or 6 spindles for equal adjustment on bolt circles.

Write for Complete Information

ERRINGTON Mechanical Laboratory, Inc.
Established 1891
Main Office and Plant: STATEN ISLAND 4, NEW YORK

Straightening Machine for Light Gauge Sheet Metals

A straightening machine, for sheet metals up to 18-gauge, is being introduced to the metalworking field by Consolidated Equipment Co., 2161 W. Wabansia Ave., Chicago 47, Ill. It is designed for the straightening, rolling, or form rolling of sheet stainless steel,



aluminum, zinc, copper, cold rolled and hot rolled steel, and other similar metals.

This machine is named the Consolidated Universal Roller & Straightening Machine and is made in three sizes for sheets up to 36", 60", and 72" wide. The unit is built with five rollers. Adjustment is quickly made for different materials and types of rolling. The unit is equipped with a variable speed transmission to permit synchronizing the speed for production work. The machine is stated by its manufacturer to offer important savings compared with heavier duty machines, for those shops working sheet metals in 18-gauge or lighter sizes.

Gripper Type Punch Press Feed

A new Haller gripper type Stock Feed for use on nearly all punch presses has been announced by Special Engineering Service, Inc., 8161 Livernois Ave., Detroit 4, Mich. Known as Model 8FTS, this hydraulically-operated unit has the capacity to handle stock up to 8" wide and to feed any desired length up to 24". Accuracy of feed is guaranteed within .003" to .005" on each stroke. This extreme accuracy conserves stock, reduces press down-time and increases die life, the manufacturers claim.

Installation and adjustments can be made quickly and easily so that the Stock Feed unit can be moved readily to other presses when desired. It is actuated

POOR POP! THEY OUGHTA PUT HIS MACHINE NEARER THE TOOL CRIB!
THAT'D HELP - BUT FIXING THOSE WORN CENTERS WITH COLMONOY TIPS WOULD SAVE HIS FEET - AND THE CENTERS TOO!
OH, NO! THEY'D LAST TOO LONG, AND WHEN HE WOULD HAVE T'GO, HE'D OF FORGOT HOW T'GIT THERE!
"WASTED EFFORT"

Worn centers outlast new centers 7 to 1

when you use Colmonoy tips

Don't throw away those worn centers. We have tips to fit all lathe and grinder centers, cast of Colmonoy No. 6, an extremely wear-resistant alloy. You can silver-solder a new tip to an old center at one quarter of the cost of a new center. And your Colmonoy tipped center will outlast a high-speed or tool steel center seven times over. So your money will go 28 times farther with Colmonoy.

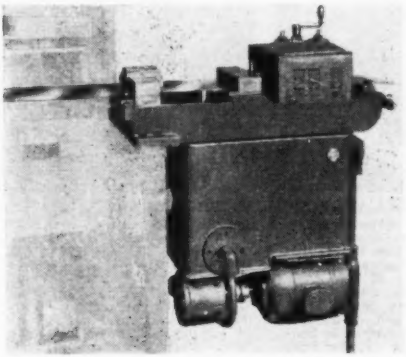
Write today for Bulletin CT-3D.

Diamonds and Tools, Inc.

Manufacturers of diamond wheel dressing tools

19347 John R Str. Detroit 3, Mich.

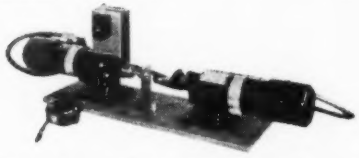
from the press ram and has sufficient power to pull the stock through a roll-type straightener which is an integral part of the unit. The Model 8FTS is mounted on the bolster plate and can be located to feed from the left, right front or back (see illustration).



A minimum amount of maintenance is required because top-quality materials are used throughout and all operating parts are in oil. The unit is completely self-contained.

Cross-Hole Drilling Set-Up

A simple set-up of automatic drilling units for speeding up the drilling of cross-holes in parts of varying sizes and shapes has recently been devised by the Govro-Nelson Co., 1933 Antoinette Ave., Detroit 8, Mich.

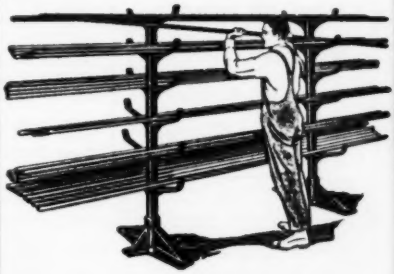


The set-up, illustrated above, was designed for the particular purpose of drilling cross-holes in fishing tackle swivels of seven different sizes. With the two drilling units operating simultaneously, the cross-holes are drilled at a rate of up to 1000 per hour, depending on the size of the swivel. Designed to clamp and unclamp the part automatically, the set-up requires comparatively little skill on the part of the operator.

The set-up is readily adaptable to a variety of parts, according to Govro-Nelson, often merely by changing the design of the holding fixture.

SPEEDS UP STOCK-ROOM SERVICE

The BROWN TIME-SAVING RACK saves the time previously lost end-hauling each bar of stock its entire length from the old-style, closed-side Rack, the Brown Rack requiring but a few inches of side movement. Each length, width and thickness of stock is displayed in gold-fish visibility for instant selection. Workmen waiting for stock are served without waste of time, and returned to their production machines to turn out a maximum of output.



Any time you require additional storage space, all you need do is ot add more units. If you want to relocate it at any time, you can do so quickly for it is unattached to the building. It is a simple, durable article made of metal in five styles. It can't burn, warp, sag or twist: depreciation is practically nil.

SEND FOR BULLETIN No. 26-M DESCRIBING—

BROWN'S *QUICK-SERVE* RACKS

BROWN ENGINEERING CO.

126 N. THIRD ST. READING, PA.

RACKS • VISES • CLUTCHES • COUPLINGS

New MITI-MITE MAGNETIC HOLDER

A Third Hand for Machinists

- Mounts on Flat or Curved Surface
- Adaptable to any Position
- 50 lb. Magnetic Pull

PRICE LIST

Model 100 Indicator Holder .....$ 7.50
Model 200 Handi-Lite .....$ 8.00
Model 300 Combination of both $15.00
Each Packaged in Wooden Box

ELIMINATES ALL CLAMPING

Place the Miti-Mite magnetic holder against any round or flat iron, or steel surface. Holds test indicators. No clamps needed. Saves time trying to find suitable place to clamp. Powerful Alnico magnet exerts 50 lb. pull. Ball and socket and swivel arm construction gives versatile adjustment. Indicator Holder has 7/32" dia. stem, which handles most indicators.

CONCENTRATED LIGHTING

The Miti-Mite Handi-Lite with magnetic base, is ideal for dark, hard to get at corners, and jobs requiring pin-point lighting. Special 40 watt bulb throws concentrated light. Adjustable shield prevents glare in operator's eyes. Outside of shield has special rayon coating to prevent heat from being transmitted from bulb to shield. Equipped with oil resistant plastic cord.

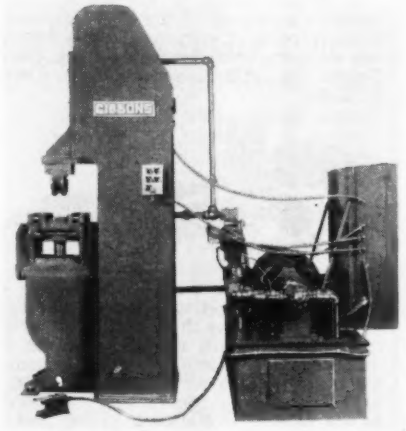
Order from your mill supply dealer or send order with name of your mill supply dealer.
Ask for Bulletin No. 600.

ENCO MANUFACTURING COMPANY
Dept 2011 • 4522-24 W. Fullerton Ave. • Chicago 39, Illinois

Gibbons Tube Bending Press

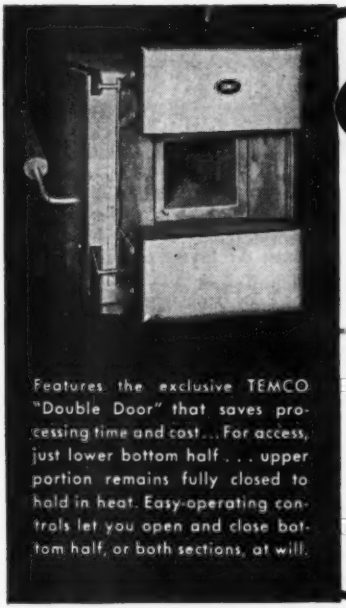
A new hydraulic press, especially designed and tooled for tube bending operations, has been announced by The Gibbons Machine Co., Tipp City, Ohio. The press, with an operating speed of 20 strokes per minute, is said to fill a definite need for a fast hydraulic press in the tubing industry.

The problem of varying degrees of bend at a particular station of a multiple index stop has been eliminated in this new unit. A new multiple positive index stop for various degree bends insures that the operator will have no unpredictable over-run, such as is usually experienced when relying on reversing a four-way hydraulic valve to control the depth of stroke. The knee width of this new press is only 11", which permits reverse bends 5½" apart. A rocker die and three sets of rockers and side arms are furnished with hydraulic pressure pad. Also featured is the overhanging type ram which operates in nickel cast iron gibs and permits bending over the top of the punch. With this construction, all operational strains are



taken off the cylinder packings and rings.

The new press, known as Series 200, is a part of the regular line of Gibbons standard, straightening, four-column, and forcing presses.



Features the exclusive TEMCO "Double Door" that saves processing time and cost... For access, just lower bottom half . . . upper portion remains fully closed to hold in heat. Easy-operating controls let you open and close bottom half, or both sections, at will.

TEMCO

SERIES 1700 ELECTRIC FURNACE

FOR HEAT-TREATING TOOLS, DIES, PARTS

A husky furnace for heavy duty service. Range 350° to 1900° F. Welded steel body with 6" dual insulation. Embedded type elements in four sides of chamber. Operates on 230 V., 1 ph. Available without controls or with two types of control instrument: (1) Temcometer stepless temperature controller and indicator or (2) electronic pre-setting type controller pyrometer.

Model	Chamber W" H" D"	Furnace Only	With Temcometer Controller	With Electronic Controller
1730	8½x7½x13½	$235.00	$297.50	$445.00
1740	8½x7½x18	285.00	347.50	495.00

Write for complete data and dealer's name.

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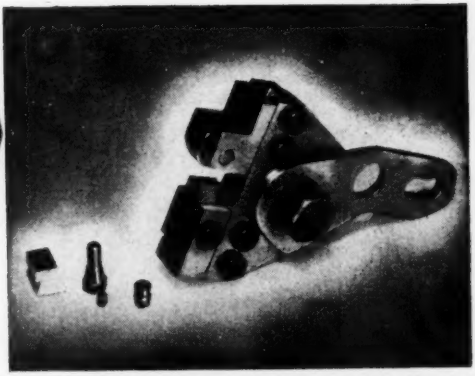

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The LITTLE SHAVER, designed for operation on Brown & Sharpe automatic screw machines, is adapted to standard tool holders in the same manner as a circular form tool. Sturdy, compact and simple in adjustment, the LITTLE SHAVER with standard or special formed tool and roll is the answer to your close tolerance problems all day long. And LITTLE SHAVER is inexpensive, too!

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WITH MARSHALL PRECISION GROUND FLAT STOCK

The world's largest range of sizes of precision ground tool steel in three grades are available, ready for immediate shipment and the layout bench.

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★ **AIRcrat:** This air-hardening tool steel shows less size change and offers a greater safety in hardening than either of the other grades.

Box 108-C

Write for descriptive literature, catalog of sizes and prices.

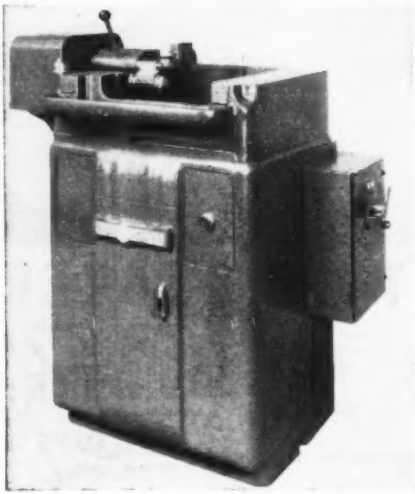
MARSHALL STEEL CO.

LA GRANGE, ILLINOIS

The Aristocrats of Ground Tool Steel

Rapid-Action Gear Tester

The Red Ring machine illustrated below is being used by one of the large automotive gear manufacturers to test automatic transmission low planet pinions for nicks by running them in mesh with a master gear. The unit is a recent development of National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich.



The rapid rate at which pinions are tested is the result of the design features of the machine itself. A power spindle, on which is mounted the master gear, drives the work pinion which is merely slipped onto its spindle in the rocking workhead—no retaining work fastener is needed.

The workhead rocks about a central fulcrum with a compression spring normally holding it at an elevation which allows the pinion and master gear to be in very loose mesh, so that the work pinion may be slipped on and off readily. In this position, a safety electrical interlock prevents the power from being turned on.

With the work pinion on its spindle and in loose mesh with the master gear, the rocking handle is pulled forward to bring the two gears in close mesh or to a predetermined center distance and, at the same time, to release the interlock. Then, by pressing the 'start' button at the right of the machine, the test begins.

As soon as the rocking handle is allowed to return to its initial position, the power is cut off and a solenoid-operated brake immediately goes into action to stop rotation of both gear and pinion for unloading and reloading the next work piece.

Although gears are thus tested very rapidly, the operator is fully protected—first, because both his hands are occupied with machine controls while the power is on and, second, by the immediate brake action as soon as the power is cut off.

Light Weight Gasoline Torches

Functional design and aluminum construction are among the improvements featured in the new models of gasoline torches offered by Otto Bernz Co., 280 Lyell Ave., Rochester, N. Y. The new features make the torches lighter, more efficient, easier to handle, and safer, according to the manufacturer.

The basic style change is in a stronger, flared tank design, resulting in greater fuel capacity and weight balance at any fuel level, as well as in better appearance. A Bakelite pistol grip handle has been designed for easier handling, improved balance and more efficient use.

The aluminum torch is shown at the left; the improved brass and steel torch is at the right. The aluminum torch is stated to be 40% lighter in weight; it eliminates soldered bushings on pump and burner joints, making the joints completely leakproof.

The simplified pump construction reduces the number of parts from sixteen to eight, minimizing mechanical troubles and repair costs. Easier to insert, the pump is perfectly sealed with finger-tight closing.

A new safety feature is the exclusive lock ring on the needle valve. The valve cannot screw out nor be forced out by pressure, preventing flame from shooting out back of the torch.

Get
30% MORE ENDURANCE
28% MORE STRAIGHT CUTS
5% MORE SPEED
WITH TODAY'S
MILFORD
ALL-HARD REZISTOR HACK SAW BLADES

Recognized for years as top performers, MILFORD All-Hard REZISTORS are even better today! Severe break-down tests, conducted under identical cutting conditions, show today's All-Hard REZISTORS have 30% more endurance, deliver 28% more straight cuts, and are 5% faster than previous REZISTORS. M-2 high speed steel, a new development in metallurgy, enables REZISTORS to withstand friction of high speed cutting — adds hours to the blade's life. Specify these longer-lived time-saving, money-saving MILFORD blades. Select Industrial Distributors can serve you from stock.

This booklet tells you more. Get your copy, and literature on the complete line, from your MILFORD Distributor today. Or, write direct to the factory.

THE HENRY G. THOMPSON & SON CO.
Saw Specialists Exclusively For Over 70 Years
NEW HAVEN 5, CONNECTICUT, U.S.A.

Profile and Band Saw Blades — MILFORD — Rezistor & Duplex Hack Saw Blades

SOLD THROUGH SELECT INDUSTRIAL DISTRIBUTORS

MODEL JA
50,000 R.P.M.
Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

$42
IN U.S.A.

THEY GRIND—NOT JUST RUB!

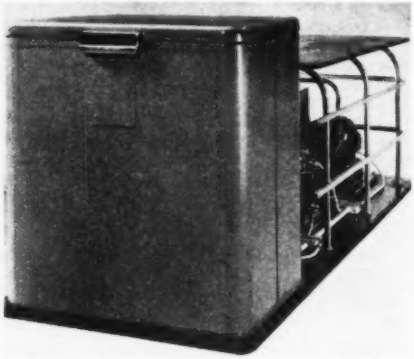
The RPM's stay up while grinding . . . not only when the grinder runs idle. It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind . . . not just rub. Every mechanic knows this, but an inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work . . . longer wheel life.

MADISON-KIPP CORP.
207 Waubesa St. Madison, Wis. U.S.A.

Write for KIPP Air Tool Catalog AT 3006

Industrial Sub-Zero Chilling Unit

A Sub-Zero Industrial Chilling unit, Model R-120, to conform with new government low-temperature test requirements, and designed for heavy duty at minus 120° F., has been developed by the Sub-Zero Products Division of the Deep-freeze Distributing Corp., 3928 Reading Road, Cincinnati 9, Ohio. Insulated with Santocel, the ten cubic feet chilling chamber is refrigerated by two refrigeration units in cascade relationship, and has a thermal capacity of 2000 B.T. U.'s per hour at -120° F.



The critical temperature of -120° F. has been established as necessary for complete stabilization of metals, heat treatment of steels, and shrink fit purposes by leading metallurgists, it is stated by the manufacturer. Firms have reported as much as 1500% increase in the life of perishable tools, while gage manufacturers have reported stabilization enabling tolerances of one millionth of an inch, with no concern over future growth or warping.

The outside dimensions of the Model R-120 are 42″ high, 80″ long and 39″ wide. The chilling chamber is 18″ x 30″ x 33″ deep inside, giving over 22 square feet of freezing surface. The capacity is 75 gallons, or approximately 10 cu. ft. The chamber has 4″ of Santocel insulation, permitting 2½ times the insulating quality of the next best insulation.

Shrink fit work has been simplified and rejects cut considerably by the sub-zero chilling of male pieces rather than subjecting the female components to high temperatures which can cause distortion, warpage and scoring. The approximate shrinkages of 2″ rings or cylinders vary with the metal. Where tool steel will respond with a shrinkage of .0022″, bronze alloys show .003″ and aluminum .0043″.

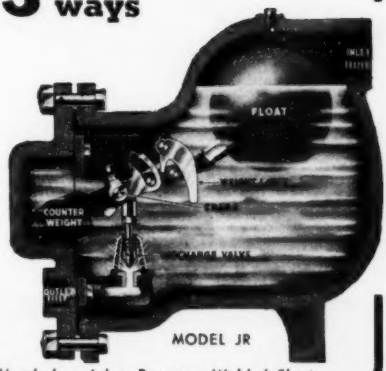
Nicholson W.O. Traps

STOP COSTLY AIR LOSS these 3 ways

With air the most expensive pressure medium today, these 3 leak-proofing features of Nicholson air traps are proving important cost-cutters:

1) No air-wasting vent, such as is in all inverted bucket traps.
2) Positive water-seal at valve.
3) Large orifice keeps valve clean, preventing blow-through.

Three types; pressures to 1500 lbs.
CATALOG 250



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PRECISION BUILT MACHINIST VISE

Enclosed design prevents chips and dirt from entering internal parts. The balanced motion of a fine threaded spindle, moving freely in an ingeniously anchored sleeve type nut, eliminates dead motion and strain on moving parts. Head moves in precision broached keyway. Complete size range of bench and combination pipe vises. Before you buy, write for our descriptive catalog and give us the name of your preferred distributor.

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THE FINEST NAME IN VISES

"C" CLAMPS
OF PEARLITIC CASTINGS — tensile strength up to 80,000 P. S. I. — lower in price than forged clamps yet equally efficient.

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Rutland reworked or repaired cutting tools are guaranteed to give new tool performance — at a fraction of the new tool cost.

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—head rivets from smallest to ¾" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—types include Vertical and Horizontal Multiple Spindles.

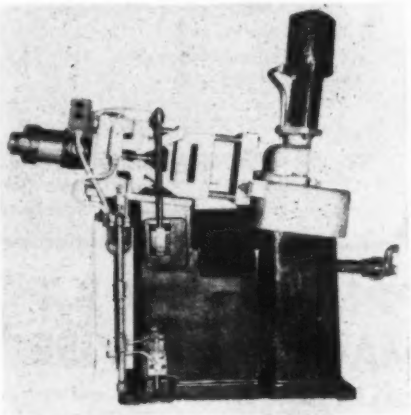
Write for literature and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.

C E Station, Bridgeport 5, Conn.

Die Casting Machine of 1-Lb.· Capacity

A new fully automatic die casting machine which eliminates the necessity of an operator is available through DCMT Sales Corp., Dept. 97, 164 Duane St., New York 13, N. Y. This machine has been built at the request of manufacturers who have long runs on small parts, which are ideal for fully automatic operation. This machine is identical with the previous model A16A (Sept. 1950 **Machine and Tool Blue Book**, p. 235), with the exception of fully automatic controls. The maximum capacity is one pound and maximum size die blocks are 9" x 9" x 2½".



Fully automatic cycling speeds are infinitely variable from 0 to 3000 shots per hour. The cycles are as follows:

1. Die closes. Final overlock of the toggle lock releases mechanical safety valve on bottom link and the top link actuates solenoid, activating piston down stroke.
2. The infinitely variable timer holds down the piston for desired length of time, then releases air to piston upstroke, setting off second timer which permits variable dwell.
3. Completion of dwell time cycle activates a solenoid controlling die unit cylinder, which opens die and ejects casting.
4. Opening of die activates a solenoid attached to side of back block, which starts cycle again.

By switching off step 4, the machine becomes a single automatic which goes through complete cycle and stops. By

switching off the other solenoid the machine can be operated by push button for opening and closing and valve lever for shot. Opening and closing speeds also are infinitely adjustable. In case a part is not fully ejected, the machine opens and stops. In case of excessive flash, preventing die from locking properly, the machine stops and will not continue to cycle or make a shot.

The Light Intensifier for Standard Bulbs

An ingenious and useful device for production and inspection departments has recently been placed on the market by Light Intensifier Co., 1525 Crane Ave., Detroit 14, Mich. The new unit, called

the Light Intensifier, simply clamps over an ordinary light bulb, and, as the name implies, intensifies the degree of light where it is most needed. It clamps on any standard type of bulb of from 40 to 100 watts. The device can be used at any angle, and directs a strong spot of light in the area to which it is directed.

Brennen Band Saw Blade Welder

A new portable, Band Saw Blade Welder, introduced by Brennen Manufacturing Co., 228 Seeley St., Brooklyn, N. Y., handles the new .050" diameter contour-cutting band saw blade, as well as all types of blades up to ½" flat.

Due to its wide range, the Brennen Welder is said to be particularly useful on internal tool and die work. Its welding facility for all types of band saw blades greatly reduces filing time, since it cuts so close to the line.

The welder is fully automatic. There are no tension adjustments or knobs to turn; the simplified controls assure uniform results at all times, even with inexperienced operators, according to the manufacturer.

A built-in grinder is designed to remove flash from the weld. The unit is further equipped with a gage for checking the weld thickness on flat saws.

The welding jaws are ruggedly constructed of solid copper. The unit is housed in a welded steel case, and overall dimensions are 7¾" x 12" x 7".

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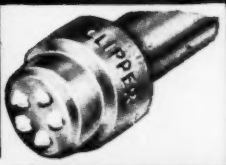
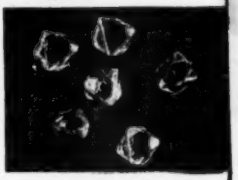


Every CLIPPER tool is guaranteed. Send blueprints. Let us quote on your requirements.

Prompt Delivery on Diamond Wheels
Representatives in Principal Cities
CLIPPER DIAMOND TOOL CO., INC.
21-D W. 46 ST. N Y 19

Industrial Universal Conveyor

Industrial Engineering & Mfg. Co., Brimfield, Indiana, has added a new industrial conveyor to its standard line. This new model, identified as 100-U, is only five feet in length. It is designed for a wide range of applications where the use of a smaller conveyor unit is considered more practical.

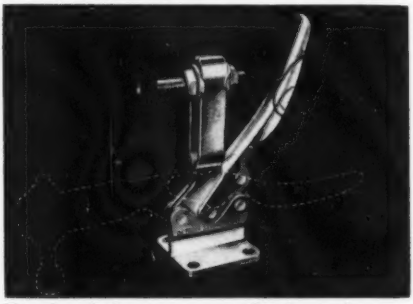
The Model 100-U is equipped with an 8-inch neoprene-impregnated belt with flights 1⅜" in height spaced on 18-inch centers (the unit is available without flights if desired). Belt speed is approximately 125 f.p.m. Take-up mechanism provides for ample belt adjustment. Pulleys are equipped with permanetly lubricated and sealed ball bearings.

The unit is powered by a 1/12 h.p. motor mounted inside the conveyor channel. A removable louvered panel provides access to the motor for maintenance. A thermal switch is located on the side of the channel, to which is attached 15 feet of 14-2 r.c. wire. Side rails, which extend the full length of the conveyor, are removable when the conveyor is used for handling cartons or bulky materials.

Compact "De-Sta-Co" Toggle Clamp

A new, compact, quick-acting toggle clamp for production work-holding is announced by Detroit Stamping Co., 347 Midland Ave., Detroit 3, Mich. Known as "De-Sta-Co" No. 235-U, the new device features holding pressures up to 650 pounds with smooth, fast toggle action. The clamping bar moves into a fully-retracted vertical position when the clamp is opened, allowing maximum clearance for speedy insertion and removal of work.

Precision-stamped from heavy-gauge steel, the No. 235-U is provided with a handle designed with full hand clearance for easy, safe operation and a rubber tipped bolt assembly which is adjustable both horizontally and to work height.



Bearing holes are reamed, pivot pins are made of long-wearing stainless steel. Dimensions of the clamp closed, are 2¾" high by 10¼" long; the open height is 6¼". The weight is 1¼ lbs. Full and half-scale template sheets to facilitate fixture design around the new clamp are available free from the manufacturer.

THE "MIGHTY MIDGET" LINE
ORDER DIRECT on 10 day Money Back Guarantee

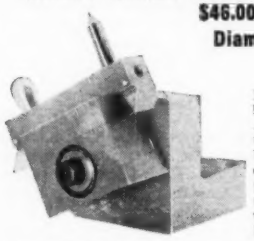
MIGHTY MIDGET RADIUS DRESSER
7" Size
$41.00 with Diamond

Hardened Shaft, Bearing Adjustable for Wear. Accurate, Adjustable 180° Stops. Diamond always Clamped Perfectly in Center.

10" Wheel Size for Norton DoAll $46.00 with Diamond

Special 14" Size $89.00 less Diamond

MIGHTY MIDGET ANGLE DRESSER
$46.00 with Diamond



First low cost high precision Angle Dresser on the market. Can be set very accurately with a protractor. Works underneath the wheel. Large bearing surfaces.

Ball Thrust Bearing. Heat Treated Cast Iron. Guaranteed Accurate.

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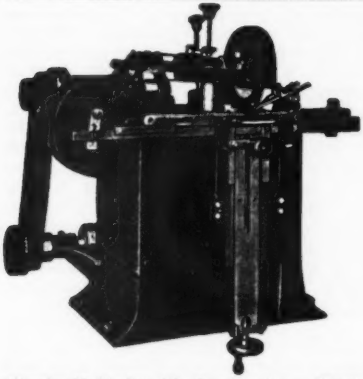

Wardwell Model EC Combination Grinder. The only single unit grinder adaptable for hack, band and circular saws that does not depend on the shape of the grinding wheel to form the shape of the tooth. This unique feature enables operator to grind a variety of blades without dressing or changing wheels.

HACK SAW BLADES
last 6 times longer

Instead of discarding hack saw blades put them back in use by resharpening them. Not one or two resharpenings but as many as 6 resharpenings are possible when the EC is used.

This machine actually pays for itself in the savings on blades alone. But more important is the exceptionally fine cutting edge it gives to old blades, actually much better than new. Blades are keener and longer lasting. Wardwell EC wheel will not burn, anneal or injure hardness of teeth. Sharpens circular, hack or band saws on one machine.

Write for Bulletin EC today.

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"SPECIAL BUSHINGS"
May Be Our Regular
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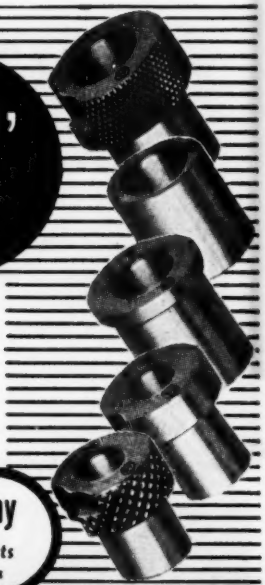
TWO complete bushing standards, the A.S.A. Standard plus our own Acme Standard, enables you to obtain bushings from stock that might otherwise require special manufacture. Results in faster delivery, lower cost. Write for catalog.



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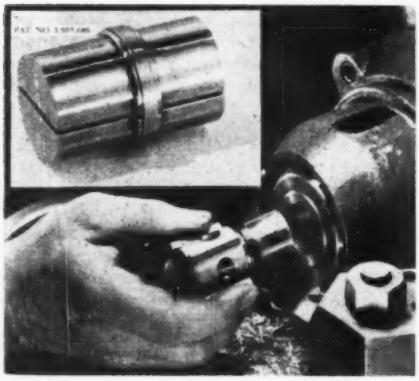
Makers of Hardened and Ground Precision Parts
210 N. Laflin Street • Chicago 7, Illinois

THE SERVICE SHOP TO INDUSTRY FOR MORE THAN 25 YEARS

New Sizes for Expanding Arbor

A new range of sizes has been announced for the Asco "Auto-Arb," manufactured by The Asco Corporation, 17718 Waterloo Road, Cleveland 19, Ohio.



The "Auto-Arb" is a production tool of the expanding arbor type, designed for holding work pieces by the inside diameter while machining, counterboring, chamfering or finishing the outside surface. It permits chucking and unchucking the work without stopping the spindle, requiring no tools for this operation. It is said to work equally well in "blind holes," and to eliminate the need for specially-built arbors for difficult jobs. It has been successfully used for machining wood, plastics and other materials as well as metal, and for coil winding applications in the electrical field. Drill presses and milling machines equipped with collet devices will speed production and handle a much wider range of work with an Auto-Arb, according to its makers.

The original Type "A" series was designed to accommodate work with inside diameters ranging from ⅜" to 1½" on five sizes of collets—the collet size determining the maximum work size. The new Type "B" series will accommodate work with inside diameters from 33/64" to 1" on a machine with a ½" collet, and from 1-1/64" to 1½" with a 1" collet, thus making the Auto-Arb principle applicable to many manufacturers who do not have machines with larger collets available.

• 45,512 PIECES PER GRIND

with WILLEY'S

SOLID CARBIDE BORING BAR

On the typical alloy cast iron valve guide bushing at the right, a Willey's Solid Carbide Boring Bar produced 45,512 pieces per grind during 50 8-hour shifts.

After this period the tip was still usable by rebrazing and regrinding.

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WILLEY'S CARBIDE TOOL CO.

SOLE MAKERS OF WILLEY'S METAL

1342 W. Vernor Highway Detroit 1, Michigan

. . . And Enlarge Your Tailstock from No. 2 M.T.

TO No. 3 MORSE TAPER

Our **Tang Slot Oversize Tail Spindle** gives your No. 2 M.T. — Tail Stock a No. 3 M.T. capacity and enables you to use 1⅝" reamers, 1¼" drills and ¾" threading dies in your 9" — 12" bench lathe. Minimum overhang saves precious working-space and reduces vibration.

TOOLS ARE HELD ROCK-SOLID BY THE TANG

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Please state make and size of lathe

GENEVA MACHINE & TOOL CORPORATION
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ALL INFORMATION, METHODS, AND IDEAS NEEDED TO PRODUCE *BETTER TOOLS AND DIES*

Practical Data on Popular Analyses of Tool Steels, their Selection, Heat Treatment, and Use

in the Revised, Enlarged SIXTEENTH PRINTING of this

TOOL AND DIE STEEL HANDBOOK

By Palmer and Luerssen

Here's the BOOK OF ANSWERS for every man responsible for tools and dies. Shows you how to increase your company's production from present equipment—how to reduce toolmaking trial and error, conserve tool steel, avoid die troubles, simplify heat treatment. Gives complete working information on everything from selection of the right steel to heat treating methods and equipment, hardness and toughness testing, latest data on high speed and hot work steels. 564 pages, 355 charts, photos, diagrams give you facts on: how design affects heat treatment, hardenability tests, time required to heat different tools to required hardening and drawing temperatures, furnace atmospheres, quenching, tempering, trouble-shooting.

PLUS 80-PAGE ALPHABETICAL SELECTOR SHOWING WHICH STEEL TO USE FOR ALMOST EVERY TOOL AND DIE. Use this book to train new men and upgrade skilled men.

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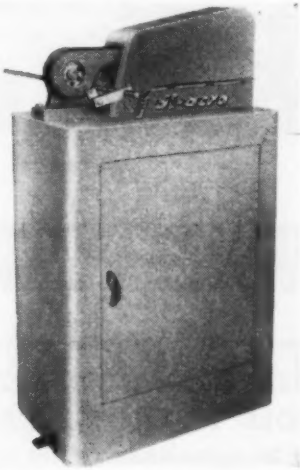
Di-Acro Power Parter

The Di-Acro Power Parter has been designed by O'Neil-Irwin Manufacturing Co., 314 Eighth Ave., Lake City, Minn., for accurately cutting or "parting-off" rods and bars of up to $\frac{5}{8}$" diameter in steel, without distorting their roundness or crushing the material. Production rates that exceed any other type of cutting methods are possible with this unit, according to its manufacturer, as it will "part-off" materials as rapidly as the operator can advance the bar and engage the foot lever.



The Di-Arco Power Parter is equipped with a 3" bore air cylinder with an adjustable cushioned stroke for quiet operation. Each cutting cycle is obtained through a 4-way foot valve, leaving both hands of the operator free to handle the stock. The air pressure required by the unit is 80 lbs.

The scope of operations of this machine ranges from small rods to $\frac{5}{8}$" diameter bars. Ten holes are provided in the standard cutting head, ranging from 1/16" to $\frac{5}{8}$" in graduations of 1/16". Special size round holes can also be supplied. Square, rectangular, hexagon and other shaped bars can often be cut satisfactorily, and cutting heads can be made to order for these operations. The standard cutting heads, of heavy alloy tool steel, are properly hardened and precision ground, assuring a high degree of accuracy.

The Ejectomatic Gauge supplied with the unit allows the three separate opera-

tions of gauging, parting and ejecting to be obtained in a single working cycle. All air equipment is housed in a welded steel cabinet, with the moving parts properly guarded. The weight of the machine is 260 lbs. The operating height is 40". The floor space occupied by the machine is 15" x 28".

Severance Countersink Set

The Severance Tool Company, 722 Iowa St., Saginaw, Mich., originators and manufacturers of the Chatterless Designed Countersinks, have grouped together in a flat wooden case a set of the most commonly used sizes of countersinks. The wooden case was designed for convenience in use, and to fit, when closed, into standard Tool-Box drawers.

Four Chatterless Countersinks comprise the set, consisting of diameters of ¼", ⅜", ½", and ¾"; they are available from stock in 30°, 41°, 45° or 60°, C/L angles.

Made of high speed steel, they cut fast and clean on a wide range of materials, and are designed to take light or heavy cuts while producing smooth, accurate, seats. There is a generous body-length provided so that each Countersink may be reground many times. The Severance Company also regrind these Countersinks for firms desiring this work to be performed by craftsman skilled in the art of grinding for chatter-free cutting.

SPECTRUM Diamond — WHEEL-LAP KIT

The Modern Way to Longer Tool Life . . . Extends Life of Cutting Tools Threefold

This complete kit with accessories is adaptable to all tool grinders for grinding, sharpening after grinding, and lap-finishing form and single point tools—carbide or steel. Assure accurate, sharp, bright, finish-lapped cutting edges for smoother, cooler cutting and longer lasting tools.
SPECTRUM LAPPING WHEELS are made of a newly discovered durable material, suitable for this purpose and will wear indefinitely. Wheels can be used with any desired diamond grit size.* . . . Complete kit ready to use, only $39.50. You can write for catalog describing complete line of SPECTRUM Diamond Lapping Compounds and Accessories, or better yet . . . Mail your order today.

SPECTRUM DIAMOND WHEEL-LAP KIT is ready for immediate use and contains:
1—5 gram tube SPECTRUM Pure Diamond Lapping Compound.*
1—6" cup-type SPECTRUM Lapping Wheel.**
1—SPECTRUM Roller for charging wheel.
1—4 oz. bottle SPECTRUM Lapping Oil.
1—SPECTRUM Atomizer Oil Applicator.

* Available in following SPECTRUM grit sizes: 120; 170; 230; 325; 700; 1200; 2500. (Mesh)
** Standard cup-type wheel—6" x 1" x 1" x 1¼" bore. Special bore sizes available.

PENN SCIENTIFIC PRODUCTS CO.
5941 ALMA STREET PHILADELPHIA 24, PA.

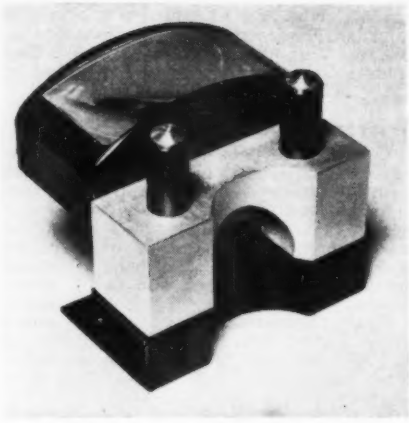
Magna Eye for Height Gages and Calipers

The ingenious magnifying instrument for height gases and calipers called the Magna Eye has recently undergone several new improvements, it is announced by Stebar Co., 711 W. Lake St., Minneapolis 8, Minn.

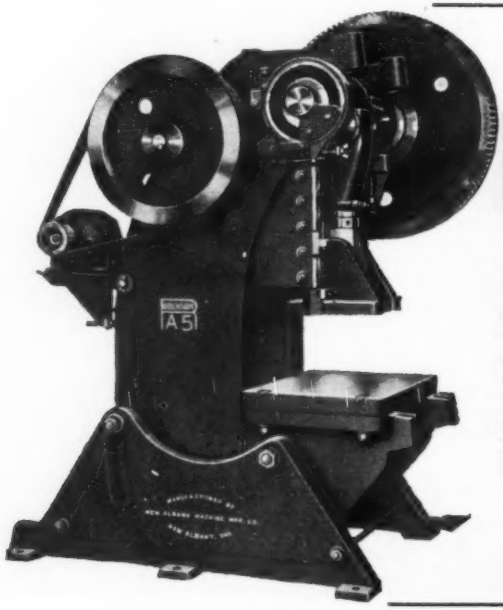
The lenses of the instrument have been redesigned and improved. A wider field is covered; the lines are true and correct, with no distortion. A larger window admits more light to the scale of tools, permitting greater accuracy in reading.

The focusing posts are shorter, making the Magna Eye a more compact instrument. The posts are now designed to screw tightly into the base, assuring greater rigidity.

The weight has been reduced through the extensive use of aluminum. A new design of the clip holding the Magna Eye to tools permits slipping into place without removing the thumb screw on tools. The device is now much faster to attach. The focusing unit is held in place when focussed through a friction adjustment that holds the proper focus without tightening screws or making other adjustments.



The new Magna Eye is said to make the reading of the scales of height gages and vernier calipers much easier. According to the Stebar Company, the superior finish will last throughout the life of the Magna Eye.



INCLINABLE PUNCH PRESSES SERIES A

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A-5 Motor Drive 88 Ton Geared Inclinable Punch Press with Anti-Backlash Brake to take care of kick back when using air cushion and heavy spring pressure pads. Timken bearings in clutch wheel and back shaft bearings. Available in 14, 22, 32, 56 and 88 ton capacity. Literature on request.

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New Albany, Ind.

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B-3 with Ball Bearing Hold Down

Make any cut—curved, straight or irregular, faster, easier and better with less material waste on a Beverly Throatless Shear. You can turn work to any position and make a clean cut as you go. Handles heavy gauges with ease—lighter metals without distortion. 4 models — capacities 18 gauge to 3/16" mild.

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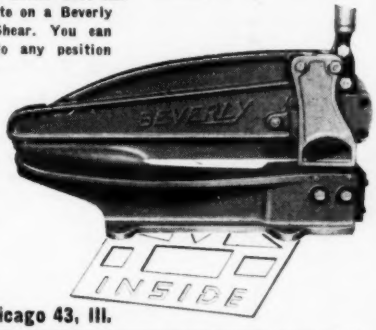
8" Reach—16 ga. cap.

Makes inside slotting cutting faster, easier, cleaner. Punch and die arrangement of 5 blades assures accuracy, clean cutting action. Cuts 2½"x1/4" slot at one stroke. Throat design permits pivoting work at any point in stroke for special inside cuts. Note sample cuts at left.

See your Beverly Dealer or write for illustrated catalog.



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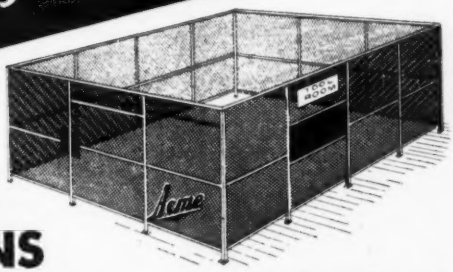

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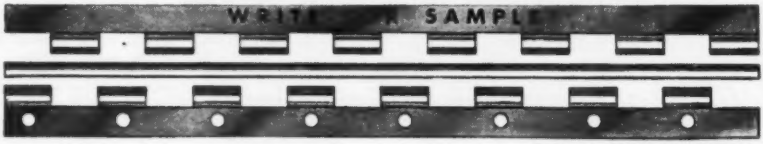

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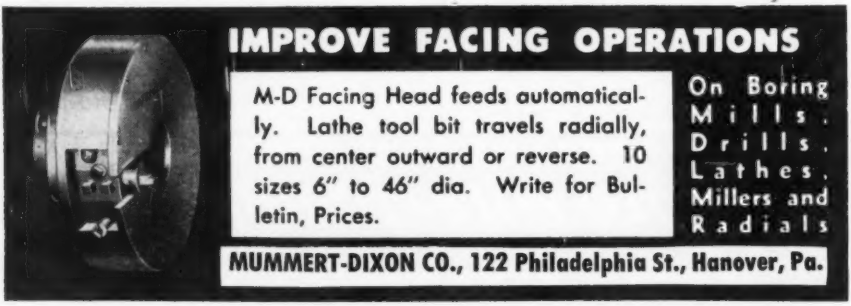
Erickson Positive-Locking Indexing Unit

The new Erickson 3-Position Indexer is a positive-locking indexing unit which speeds up and simplifies locating and positioning operations that require three divisions (120°). It is a recent development of Erickson Tools Division, 2315 Hamilton Ave., Cleveland, Ohio.

The 3-Position Indexer can easily be adapted to any job requiring 3-position locating. Thus, the need for many expensive work-holding devices for various milling, drilling, punching and similar machining operations is eliminated. This adaptability alone can result in important savings on tool and fixture cost within a short time. The 3-Position Indexer operates on either air or hydraulics with no change in mechanism, the manufacturers state.

When connected to table controls for fully automatic operation, the Erickson 3-Position Speed Indexer is said to afford even greater economies. The indexer follows a complete cycle of operations without attention from the operator. This reduced cycle time is stated to result in increased production and decreased labor costs. Time-consuming adjustments and set-ups between operations are done away with. Because accurate spacing is insured by the positive locking mechanism, scrap and rework are practically eliminated.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ROLLS PART OR COMPLETE CIRCLES

PRODUCTION CIRCULAR BENDING

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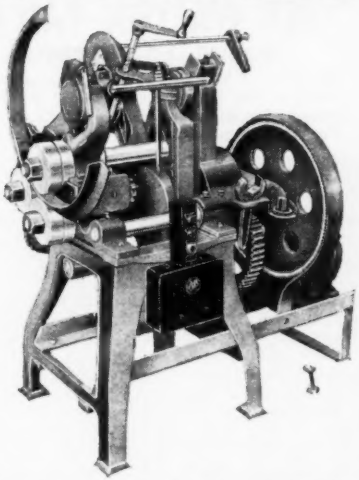
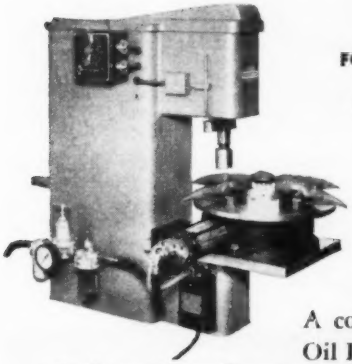


EXCELSIOR TOOL & MACHINE COMPANY, EAST ST. LOUIS, ILLINOIS



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HARTFORD 10, CONNECTICUT

Spectrum Diamond Wheel-Lap Kit

A complete wheel lapping kit with accessories which are adaptable to all tool grinders for lap finishing and sharpening after grinding is contained in the Spectrum Diamond Wheel-Lap Kit. It is a recent development of Penn Scientific Products Co., 5941 Alma St., Philadelphia 24, Pa. With the use of this diamond lapping compound and its accessories, accurate, sharp, finish-lapped cutting edges for smoother, cooler cutting and longer lasting tools are assured, according to the manufacturer.

The Spectrum Diamond Wheel-Lap Kit contains a 5-gram tube of Spectrum Diamond Lapping Compound; one 6" cup-type lapping wheel; one roller for charging the wheel; one 4 oz. bottle of Spectrum Lapping Oil; and an atomizer oil applicator.

The new Spectrum Lapping Wheels are made from newly discovered materials stated by Penn Scientific Products Co. to be ideally suited for lapping purposes. They are stated to be superior to metal or wood wheels, are easily charged, and are said to wear indefinitely.

There are many applications where it is advisable to use this inexpensive wheel lap kit using the special Spectrum Lapping Wheels charged with the diamond lapping compound as a substitute for diamond wheel application. The resin

plastic wheels can be quickly shaped for any kind of special tooling. They are particularly recommended for the heavier grits for rougher stock removal rather than the finer grits.

High-Speed Hack Saws

Vari-Speed Transmissions

Lathe Stops

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- Surface Grinders
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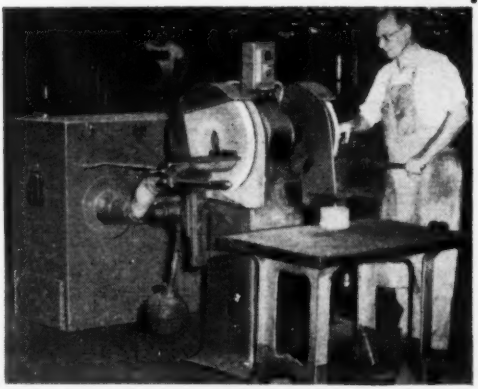
22 different Dustkops
300 cfm to 10,000 cfm
available from stock . . . dusts from



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Please send catalog page, prices and name of nearest supply house.

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Lincoln Insulated Electrode Holder

A new insulated electrode holder has been introduced by the The Lincoln Electric Co., Cleveland 1, Ohio. The new holder, the LJ-1, designed around an unusually small size, combines the advantages of both tong and hole type holders in providing a strong, "lock-jaw" electrode grip, yet with an easy thumb pressure electrode release. The holder's small size is useful for operation with heavy gloves and in corners and other confined areas.

The tip of the jaw end of the holder is covered with a high temperature resistant, asbestos base compound which is highly flexible. The tip cannot be broken by the impact of dropping or crushing. The tip will also resist the abrasion of rubbing against metal as well as the wear caused by weld spatter. Weld spatter will not adhere to it.

Because of its flexibility, the molded tip can be formed to cover the end of the holder completely, thus giving full insulation. The electrode is held close to the end of this tip so that the holder can be worked in close quarters without danger of grounding. The handle and jaw lever arm are also insulated, covered with a tough high temperature fibre.

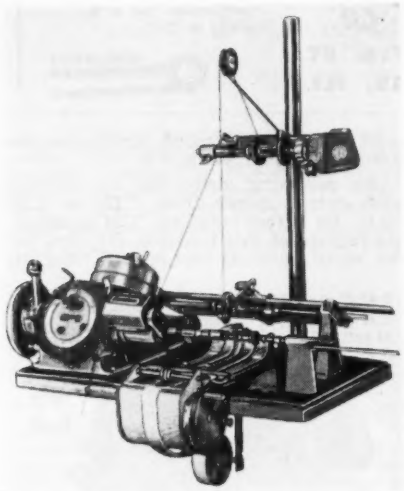
The metal frame of the holder is a high strength electrical bronze said to give the best combination of strength and thermal conductivity.

A lever type jaw is used for gripping the electrode. The jaw is loaded with 50% additional spring capacity which gives approximately nine times as much grip as coil springs. The release handle lever, however, givs a high degree of leverage so that inserting or releasing an electrode is quick and easy. A light thumb pressure on the arm opens the jaw. The cam jaw construction, open to one side of the holder, gives one position, 20° off vertical for downhand welding, and a second positon, 30° off horizontal for overhead welding. A hole is provided in the jaw for holding 18" center grip electrodes.

The Model LJ-1 is manufactured in the 250 ampere size for 1/16" to 3/16" electrodes.

Fine Wire Coil Winding Machines

The Micafil Fine Wire Coil Winding Machine, Model No. 00FA - 1/1 PE, with an automatic paper interleaving attachment is introduced by the Cosa Corporation, 405 Lexington Ave., New York 17, N. Y., U. S. representative for Micafil Ltd., Zurich, Switzerland.



This machine, when guided automatically, is designed to handle fine wires from 24 to 48 AWG (without insulation); and wires up to 15 AWG (without insulation) when guided by hand. It will wind coils up to a maximum of 3⅛″ coil diameter and from ⅝″ to 3¾″ wide. The paper interleaving attachment automatically lengthens the paper strip as the coil diameter increases; it will handle paper widths from ¾″ to 4″ and lengths from 3½″ to 10″.

The device features accurate and stepless adjustment of the wire guide advance, even while the machine is running; automatic reversing of wire guide at layer end; easy and precise method of setting the layer width; simple adjustment of wire pull, which will remain constant, regardless of speed and reel diameter; automatic cut-off either at a pre-set number of turns, or by wire breakage or by an empty reel.

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Takes Guesswork out of Sharpening Circular Form Tools

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- Helps get more correct pieces per grind.
- Simple operation — inexperienced men can sharpen tools properly.

Write for Complete Information

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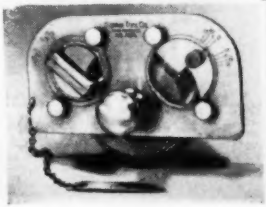

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All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

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SPECIFICATIONS:
Open width 7/8" to 6"
Gage Material .040 to .125
Pin Diameter .101 to 3/8
Lengths to 120"

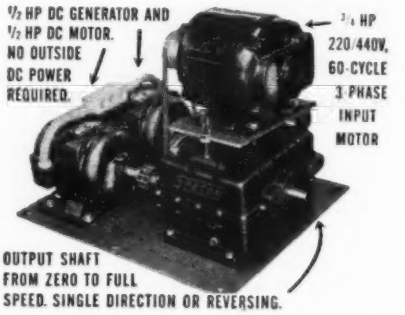
½ H.P. Variable Speed Drive

A new variable speed drive rated at ½ h.p. in non-reversing (reversible if desired) and 1/3 h.p. in reversing model is a recent addition to the line of Specon ED Drives manufactured by the Speed Control Corp., 1450 E. 289th St., Dept. C-20, Wickliffe, Ohio.

The new Specon No. 00ED Drive makes use of a unique motor generator combination consisting of a standard a.c. squirrel cage motor, two standard d.c. motors and a differential gear box. The a.c. motor is coupled with two d.c. motors through the differential gear box. The d.c. motors are connected in a closed loop and require no outside d.c. source of power.

The maximum output speed of the non-reversing model can be supplied from 250 to 1000 r.p.m. for direct coupling. The minimum output speed in all cases is zero, although motors are not stopped, but continue to run. The outstanding characteristic of the No. 00ED Drive is the fact that maximum torque is obtained at zero speed, with gradual decrease as the output speed increases, until at the rated speed, the torque assumes the rated value.

The reversing model can be supplied with output speeds from ±150 to ±600 r.p.m. for direct coupling. The outstanding feature of this model is the fact that the speed reversal occurs with absolute

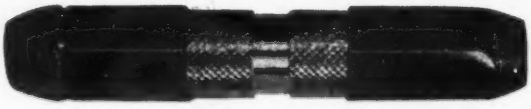

½ HP DC GENERATOR AND ½ HP DC MOTOR. NO OUTSIDE DC POWER REQUIRED.
¾ HP 220/440V, 60-CYCLE 3 PHASE INPUT MOTOR
OUTPUT SHAFT FROM ZERO TO FULL SPEED. SINGLE DIRECTION OR REVERSING.

smoothness, the same as any other change of speed within the full ± speed range.

Since these drives have their greatest torque output around zero speed, they

COLLET TYPE PIN GAGE HANDLE

(Bushings for cylindrical and thread plug gages)



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DETROIT

Deep Holes—Exclusively

are the logical equipment for any application when a greater torque is required at slow speeds. The Specon Drives require no complicated and extensive controls. They perform difficult functions with simple standard control equipment such as ordinary potentiometers and rheostats.

Bench Cabinet for Cleaning Small Parts

Designed for the abrasive blast cleaning of small parts such as automobile pistons, dies, tools, castings, etc., this portable Bench Blast Cabinet will operate on the compressed air which is supplied by a standard 5 h.p., 2-stage garage compressor. The unit is a product of The W. W. Sly Manufacturing Co., 4700 Train Ave., Cleveland 2, Ohio.

The operator loads the parts through the top hinged cover and observes the work through the window in the cover. The operator's hands in the rubber gloves rotate the work in the blast stream. A ventilating fan draws off the dust which is retained in a removable filter bag.

Efficient vision during the blasting operation is provided by a side-mounted light. The cabinet only requires a bench space of 14" x 18".

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LONGER LIFE — FASTER CUTTING STRENGTH

WE SPECIALIZE IN SMALL SIZES

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THE SECRET—

of their durability and long life lies in our method of grinding which produces a smooth, unbroken cutting edge. No saw tooth edge to load up and break down.

MICRO MINIATURES

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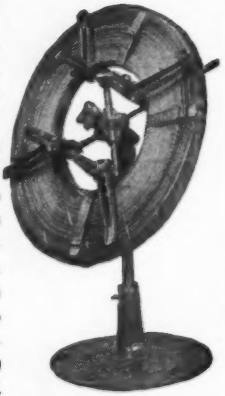
QUICK-LOADING STOCK REELS

The S and S stock reels with quick loading arms are designed for the economical handling of stock from coils. Constructed with a snap lock knuckle joint for loading. These reels may be set in any plane from vertical to horizontal. Double swivel reels are manufactured so that loading is possible while other spool is reeling out stock.



Dial And Roll Feeds For Presses

S&S MACHINE WORKS
4539 W. Lake St., Chicago, Ill.

"OLIVER"

No. 585 Oilstone

TOOL GRINDER

Keeps tools in tip-top shape

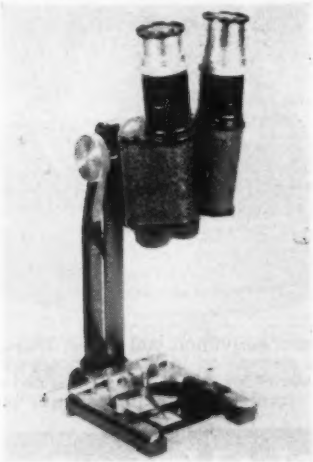
- Coarse Oilstone
- Fine Oilstone
- General Grinding Wheel
- Grinding Cone
- Stropping Wheel
- Tool Holders
- Ball Bearings
- Direct Motor Drive
- Connects to electric light socket

Write for Bulletin No. 585

OLIVER MACHINERY COMPANY
GRAND RAPIDS 2, MICH.

Wide-Field Binocular Microscope

The George Scherr Co., Inc., 198 Lafayette St., New York 12, N. Y. has recently placed on the market a special Wide-Field Binocular Microscope with an attachment to simplify the counting of threads in fabrics. The microscope with its Oestermann Attachment is illustrated below. Three templates, ¼", ½", and 1"



square, are furnished. A pointer or indicating finger attached to a precision slide with a screw, is moved along the cloth from thread to thread, making the count of even the finest weave possible without error. The image is fully erect, corresponding to the actual movement right or left, up or down. The Wide-Field Binocular Microscope permits examination of a comparatively large section in various magnifications, according to requirements.

Two types of microscopes are available. The Model A low power type is furnished with two pairs of interchangeable eyepieces giving total magnifications of 4¼X and 6½X, with fields of view of 1.7" and 1.3" respectively. The focal distance is 8⅜". One of the eyepieces is individually adjustable to take care of differences in eyesight. The Model B high power instrument has three pairs of eyepieces, producing 10X, 20X and 30X magnifications for fine weaves and fields of view of 0.63", 0.43" and 0.32", respectively. The focal distance is 3⅛".

The large working distance, with its wide field, makes this instrument highly suitable for quality analysis, dissecting and repairing of textiles of any kind.

GEARS

Small and Medium

SPURS (internal and external)
HELICALS
STRAIGHT BEVELS
SPROCKETS
RACKS
WORMS
WORM GEARS
THREAD GRINDING

COMPLETE GEAR TRAINS

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1033 Parmelee St., ROCKFORD, ILL.

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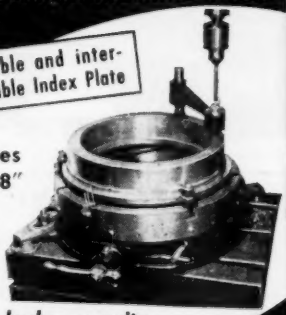
Removable and interchangeable Index Plate



Three Sizes 12"-15"-18"

Also Worm-wheel Operated Rotary Tables 9"-25"

See your dealer or write for Catalog No. 14

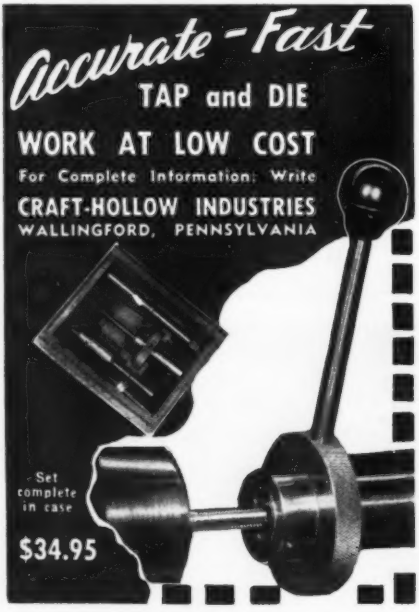
Troyke Mfg. Co. Inc.
Cincinnati 9, Ohio, U.S.A.

Dings Improved Lifting Magnet

The Dings Magnetic Separator Co., 4740 W. Electric Ave., Milwaukee, Wis., announces an Improved Lifting Magnet as an addition to its line of magnetic equipment. The magnet can be used on overhead or crawler cranes to hoist, load, transport and otherwise handle all types of magnetic materials.

The manufacturer states that this Magnet features lighter weight, with welded construction replacing bolted construction; an insulating compound that dissipates heat more rapidly and provides more protection against short circuits

between individual coil wires; four-point chain suspension instead of three; protector guards for the cable; a balanced magnetic circuit that eliminates flux "bottle-



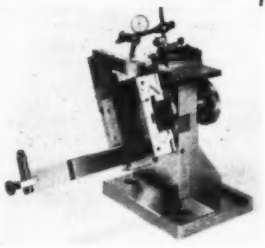
ATLANTIC
GEARS
SPUR-SPIRAL-WORM-BEVEL GEARS GENERATED WITH PRECISION ON MODERN EQUIPMENT-SEND SAMPLES OR BLUEPRINTS FOR QUOTATION!
ATLANTIC GEAR WORKS, INC
198 LAFAYETTE ST • N.Y. 12, N.Y.
CA 6-1440

GREATEST GRINDING ADVANCEMENT IN YEARS

The new Universal Form Dresser features a movable center line using gauge blocks on both column and base. Many radii and angles may be connected on the same wheel to complete an entire form. Angles are set by sine bar and increased range plus greater accuracy are possible because bearings and slides are of preloaded ball design.

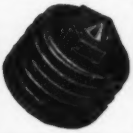
Write for Complete Details Today!

UNIVERSAL FORM TOOL COMPANY
7410 RUTHERFORD AVE. - DETROIT 28, MICHIGAN



A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring blind screw holes.



The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in $\frac{1}{16}$" to 1" diameters. *Send for price list.*

HEIMANN MFG. CO.

332 Lincoln Ave. Urbana, Ohio

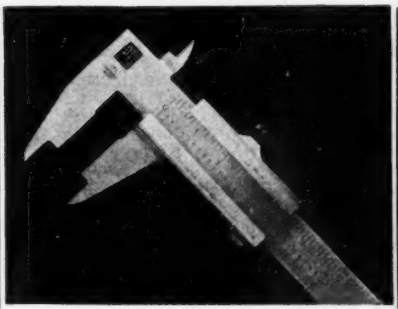
necks," thereby giving the magnet greater lifting ability. The lifting strength of each magnet is tested and certified before it leaves the factory.

The Improved Dings Lifting Magnet is now available in five sizes: 29", 39", 45", 55" and 65" diameter.

DROP FORGING QUIZ

Answers to quiz on page 86.

1. A forging defect.
2. Driving steel shot
3. Piece of removable steel in die
4. End holes for handling
5. Removing scales in rotating container
6. A thin plate of metal on surface
7. Portion of die which reduces cross section of stock
8. Undercut
9. Parting line
10. Edger



UNIVERSAL VERNIER CALIPER

for inside, outside and depth measurement

An unusual value in a guaranteed, high precision instrument. Of Swiss make, it is equal in quality to the world's best. Made of stainless steel with hardened jaws and blade. Scale 7" long, measures 6". Vernier 1000ths and 64ths. Comes packed in de luxe leatherette case, for only . . . $24. Full satisfaction guaranteed or money refunded after 10-day trial. Order direct (either C. O. D. or remit with order) from

PTI, INCORPORATED 401 Broadway Dept. BB-1 New York 13, N.Y.

Lassy TAPPERS and WORK HOLDERS

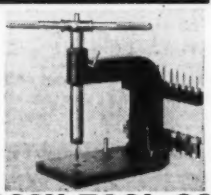
UNIVERSAL

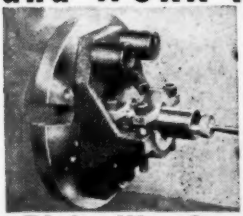
TAP AND DIE GUIDE FIXTURE

3 Sizes

Capacity No. 5 to 1" Pipe taps to ⅝"
Threading die adapters to 1½" O.D.

Immediate delivery.





Quick, accurate setups on Lathes, Grinders, Jig Borers, Milling Machines and Drill Presses. Accurate to .0002 in 3" Hardened steel "V" Insert. Also made with quick acting clamps for production work.

LASSY TOOL CO., Plainville, Conn.

RUNS COOL AT 38,000 RPM

Roto-Master Hi-Speed grinder makes carbide roughing and finishing available to every shop. Designed for operations requiring precise "fingertip" control, in conjunction with carbide burrs and mounted wheels from 1/16" to ¼" dia.

MAKES CARBIDE ROUGHING AND FINISHING AVAILABLE TO EVERY SHOP

Roto-Master's SUPER COOLING system enables operating speed of 38,000 RPM. Operation requires practically no pressure . . . consequently grinder can be used continuously for hours without heating.

Try Roto-Master in your shop. If not completely satisfied return within 15 days at no charge. If not rated send check or M. O. for $27.50.

$27.50

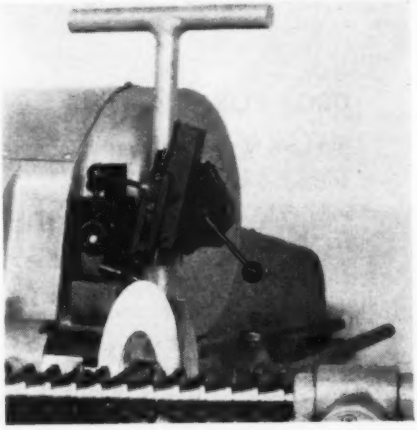
MASTER APPLIANCE MFG. CO. **4th at Ontario, Racine, Wisconsin**

Colonial Wheel Dressers for Broach Grinding

Dymon-ize grinding wheel dressing attachments, designed for use on broach sharpeners, have now been made available generally by Colonial Broach Company, Box 37, Harper Station, Detroit 13, Mich. The Dymon-ize dresser was developed originally to permit grinding of new broaches to higher finishes in Colonial's own plant. The unit consists of an adjustable mechanism which can be used to produce a fine finish on both the radius and sides of a broach grinding wheel.

The finer wheel finish has been found to increase surface smoothness not only on broaches but on the machined surfaces produced by those broaches (holes surfaces, splines, etc.) according to Colonial. Much of this is apparently traceable to the reduction in height of the minute "tool marks" at the cutting edges of the broach teeth. Smoother chip flow in curling up in the chip space is also reported to be a characteristic of broaches sharpened or re-sharpened with Dymon-ized wheels.

The linkage which covers the arc of travel of the diamond point in the standard Dymon-ize dresser is such that any radius up to 5/16" can be readily dressed by a single adjustment. The unit has two



control handles—one for dressing radii, and one for dressing the side of the wheel tangent to the radius.

NEW... GANG VISE

Equalizing Grip — Holds All Lengths, Shapes and Sizes for 3-Position Grinding and Milling.

Famous Dery patented Equalizing pads with "V" grooves form three point holding chuck for each piece of work. New Dery design permits fixture "flopping" for faster grinding and milling operations.

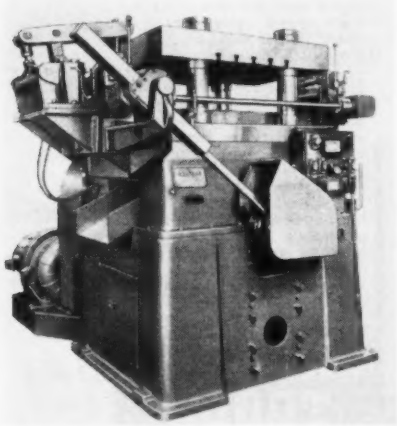
Send for Illustrated Folder.

dery TOOL & DIE CO., PINE MEADOW • CONN.

Brandes 175-ton Automatic Press

A complete line of wide bed automatic presses, ranging in size from 30 to 2500 tons, was recently announced by the Brandes Press Co., Dept. F, 6408 Euclid Ave., Cleveland 13, Ohio.

One of the new presses, shown below, is a 175 ton wide bed press. It is built to Joint Industrial Conferences' standards, including "T" slots in the top platen and complete remote control of the variable speed drive. This press features a die clearance of 28″ from front to back, by 60″ from right to left. The roll feeds have a 3″ vertical adjustment, and will take material up to 18″ in width. The scrap cutter has a 1″ horizontal adjustment. The pitch adjustment of the roll feeds ranges from 0 to 12″.



This 175 ton press will take strokes up to 10″. A speed of up to 250 strokes per minute is obtainable, depending upon the length of the stroke. One outstanding feature of this press is that no moving parts or projections are built below the base of the unit.

Reciprocating parts are air counterbalanced by air cylinders, and incorporate the long multiple "V" guides in the base and long guides on the draw rod. This gives an even pulling action to the top platen, increases die life and assures high production speeds, the manufacturers state.

A remote push-button control panel, also built to J. I. C. standards, gives the operator complete control of the press.

SOLD THRU LEADING SUPPLY HOUSES

GROBET CHATTERLESS COUNTERSINKS

Six staggered cutting edges give shearing cut that eliminates all chatter.

SEND FOR CATALOG C-CI.

GROBET FILE CO. of AMERICA, INC.
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FLYNN

FOR OVER 30 YEARS THE PREFERRED OFFSET BORING HEAD

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RIGID • ACCURATE • SAFE

- Ground micrometer offset screw.
- Large, easy-to-read graduated dial.
- "V" tool block, hardened, ground.

A model for practically every tool room and production operation.

FLYNN MANUFACTURING CO.
437 BATES STREET • DETROIT 26 MICHIGAN

THIS NELCO FACE MILL DOES THIS JOB...

IN 1/2 THE TIME - AT 1/2 THE COST!

THE blanks shown are milled six at a time with Nelco Carbide-tipped Face Mill No. 8106F. The floor to floor time is 1½ min. compared with 3½ min. with the high speed cutters formerly used. When all manufacturing costs including costs of tips, costs to re-grind, cost to re-tip and grind, and the cost of the cutters per piece have been compared with similar costs for high-speed cutters, the figures are .114 cents per piece with Nelco Carbide-tipped tools against .334 cents per piece with high-speed tools. This is one of many examples of the way in which Nelco users are saving hundreds of valuable production hours and lowering their costs.

OPERATIONAL RESULTS

Specification: Nelco Face Mill No. 8106F.
Material: S.A.E. 1045 gas cut. Speed — 500 R.P.M. Feed 15" P.M. Compare these results:

TIME — With high speed cutters 3½ min. With Nelco Carbide-tipped cutters 1½ min.

COST — With high speed cutters .334 cts. per piece. With Nelco Carbide-tipped cutters .144 cts. per piece.

NELCO TOOLS

For that extra edge in production

WRITE for descriptive literature and name of your Nelco Distributor.

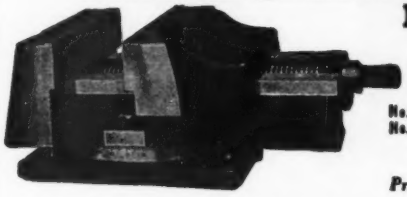
NELCO TOOL CO., INC., Manchester, Conn.

Variable Speed Combination Units

The Metron Instrument Co., 432 Lincoln St., Denver 9, Colo., has made available integral combinations of its standard miniature variable and fixed ratio drives. These combination units are small, sealed, packaged items which retain the features of their individual components. For low-power applications requiring both speed reduction and variable speed, these combination units deliver 2 pound-inches of torque. Applications include timers, recorders, controllers, computers, indicating mechanisms and similar devices.

By combining the variable ratio unit with the proper fixed ratio, a variable output speed is obtained at any desired nominal speed, and is infinitely adjustable from 1/6 to 6. For example, an 1800 r.p.m. motor coupled to a combination unit having a four section, 531,441 to 1 reduction gear unit will give a variable output speed of 0.6 revolutions per day to 20 revolutions per day. Or, if a single section, 2 to 1 reduction gear unit is

SUPERIOR QUALITY AND WORKMANSHIP IN PLUNKET VISES



SQUARE BASE SHAPER VISE

The Shaper Vise has graduated swivel base and tongue in center to fit slot in table, and has holes for bolting down. In ordering this vise give size of slots in Shaper Table, also distance from center to center of slots.

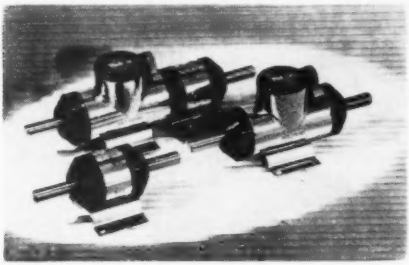
No. 40, 10" jaws, 2¼" deep, opens 8½". Weight 125 lbs... $92.40
No. 4, 6" jaws, 1½" deep, opens 5". Weight 45 lbs..... $68.20

Our complete line includes Vises for Drill Presses, Milling Machines, Shapers and Grinders.

Prices are net, f. o. b. Chicago. Write for illustrated folder today. Dealers inquiries solicited.

J. E. Plunket Machine Co. 1823 W. Lake St. Chicago 12, Ill.

used, all output speeds between 150 and 5400 r.p.m. are available.



Design features include ball bearing shafts, permanent lubrication, and sealed construction. The fixed ratio sections are available in extruded gears or hobbed gears, and can be obtained in any of hundreds of standard ratios.

"Quik-Set" Boring Bar Holder

A new boring bar holder for lathes up to 12 inches is announced by the Glendale Mechanical Laboratories, 1822 Victory Blvd., Glendale 1, Calif. The new tool is said to meet a long-felt need in the metalworking field, and is to be marketed under the name "Quik-Set," which is indicative of its quick application to the lathe and the work in hand.

The new tool is stated to offer several distinct advantages, leading to more efficient and satisfactory operation in all types of boring work encountered by machinists, tool and die makers and metal processors generally. The rapid, vertical adjustment of the bar to the work piece is important, whether on center, below center, above center or any intermediate position, by virtue of the cylindrical carrier.

A ¼" diameter bar of high speed steel, together with 7/16" and 11/16" bars (complete with high speed bits) are furnished. All bars are quickly interchangeable and are adjustable in all planes and to working depth of cut, by the use of the 5/16" hex wrench furnished. The clamping action on the bar is positive, being over practically the entire diameter of the bar, and for a length of over 2", thus assuring chatterfree operation, even in the most difficult cases. The usual "3-point" clamping action (which introduces initial stresses in the bar) is eliminated. A T-nut to fit the lathe specified, together with all bars, plugs and wrenches are furnished as standard equipment.

WALTHAM CYLINDRICAL SUB-PRESSES

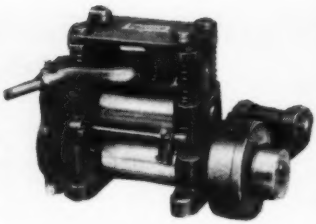
Dies for high precision work should not only be perfectly aligned but provision should be made to maintain that alignment throughout the life of the die. Our bulletin shows how it can be done.

ARCH SUB-PRESS

WALTHAM MACHINE WORKS WALTHAM 54, MASS.

La Bahn

OVER 50 MODELS AND SIZES FOR ALL TYPES OF MATERIALS — MAKE YOUR PUNCH PRESS AN AUTOMATIC MACHINE BY USING LA BAHN PRECISION ROLL FEEDS.



Roll Feeds

LA BAHN ROLL FEEDS, STRAIGHTENERS, SCRAP CUTTERS AND CRADLES ARE IN USE ALL OVER THE WORLD HELPING MANUFACTURERS REDUCE PUNCH PRESS OPERATION COSTS UP TO 60%. WRITE FOR LITERATURE AND QUOTATION ON YOUR PARTICULAR PROBLEM NOW.

LA BAHN MACHINE & MFG. CO. Dept. HJ Metuchen, N.J.

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THE PRECISION CHOICE OF WORLD-WIDE INDUSTRY

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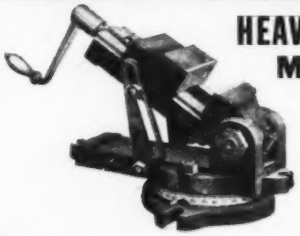
REID BROTHERS CO., INC.

Beverly • Massachusetts

PALMGREN

ANGLE VISES



HEAVY-DUTY Model

For Quick — Accurate Set-ups

PALMGREN Heavy Duty Angle Vises are built sturdy and rugged for tough, heavy jobs. They are accurately graduated in degrees, can be quickly adjusted to any angle, stay locked under severe service and save valuable hours otherwise wasted in tedious make-ready, wedging or making temporary jigs and fixtures.

Jaws are hardened and ground. Special outstanding features are the size and opening of jaws—4" Jaws open full 4", the 6" Jaws open full 6" etc., with corresponding depth of Jaws. Vise can be used as ordinary vise when lowered to horizontal position. Swivel bases furnished if desired. Sizes 4", 6" and 8" Jaws and openings. Prompt deliveries.

Write for Bulletin B-5 "101 Angle Operations" and complete line of PALMGREN Vises

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CHICAGO TOOL & ENGINEERING CO.

Mfrs. of PALMGREN PRODUCTS for over 25 years

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PRECISION WORK AT ANY ANGLE

USE ECONOMY — DERIVE ECONOMY

SOCKET HEAD CAP SCREWS

MILLED FROM BAR

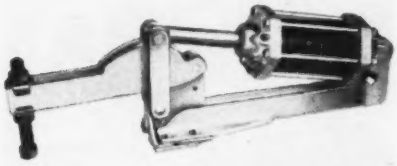
HOLLOW SET SCREWS

MADE OF ALLOY STEEL

ECONOMY MACHINE PROD. CO., 5207 Lawrence Ave., Chicago 30, Ill.

Knu-Vise Air-Operated Clamps

Two new air-operated clamps have been added to the Knu-Vise line by, Lapeer Manufacturing Co., Lapeer, Mich. They are catalogued as Models AO-200 and AO-400—the former having a clamping force of 200 lbs. at the end of the toggle bar and the latter 1200 lbs. The toggle



bar in each is in the form of a channel which permits the spindle to be moved along its full length to accommodate the work at hand. With the spindles positioned close to the base of each clamp, the force is increased to 475 and to 2875 lbs.

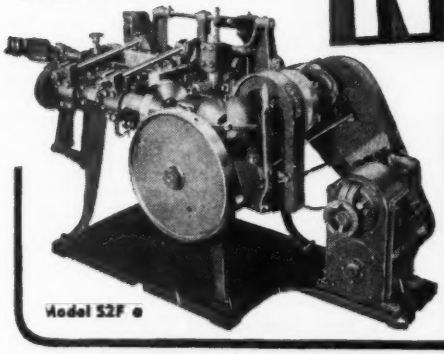
These models were designed to provide greatest efficiency in clamping where conditions were unusual: (1) in single installations where operators fatigue is a factor and where ordinary clamps would prove impractical, (2) in multiple installations controlled by a single valve, (3) in multiple installations where sequence valves would operate certain clamps at predetermined intervals.

The specifications of the clamp are given as follows: For the AO-200; overall length (closed) 9-11/16" and (open) 7-1/16"; overall height (closed) 3" and (open) 5-9/16"; width of clamp 1⅞"; shut height 1¼". For the AO-1200: overall length (closed) 20-13/32" and (open) 13-9/16"; overall height (closed) 6½", (open) 14"; width of clamp 3⅞"; shut height 3¼". Maximum air pressure for either clamp is 85 p.s.i.

The models are double-acting, and will not release the clamped work in case air pressure accidentally fails. Restricting fittings, which control the speed of the opening and closing of the clamp, also provide a cushioning effect that eliminates hammerlike action.

Templates of these clamps, like those for all other Knu-Vise clamps are available in both full-and half-size measurements.

There's Nothing like a NILSON for Rapid Production



Model 52F

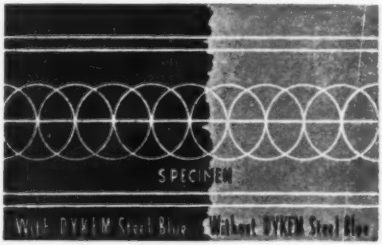
• Combination Press and 4-Slide Forming Machine

Extra rigid construction; tooling costs are generally lower; forming tools are interchangeable and easy to adjust. Send for catalog.

A. H. NILSON MACHINE CO.
BRIDGEPORT 5, CONN.

Automatic Wire and Metal Forming Machines • Staple Forming Machines • Chain Making Machinery • Foot and Power Presses • Wire Reels • Wire Straighteners.

SPECIALISTS IN WIRE FORMING EQUIPMENT FOR OVER 50 YEARS



DYKEM STEEL BLUE
STOPS LOSSES
making dies & templates

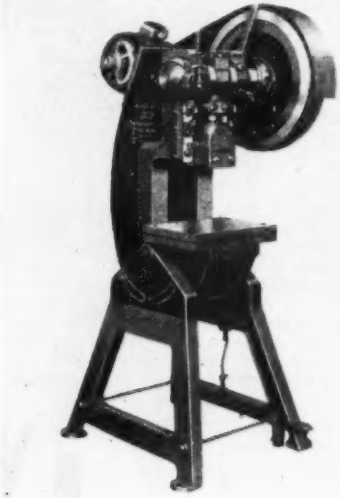
Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lay-out lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

THE DYKEM COMPANY
2301G North 11th St., St. Louis, Mo.

Press-Rite 15 Ton O.B.I. Press

The new Press-Rite No. 1½, 15 ton open back inclinable press has recently been placed on the market by the Sales Service Machine Tool Co., 2363 University Ave., St. Paul 4, Minn. This positive single-stroke press is equipped with a Press-Rite sliding key clutch with a four-point



engagement ring and a roller bearing mounted flywheel. The diameter of the crankshaft at the bearing is 2⅛", and at the pin 2⅜".

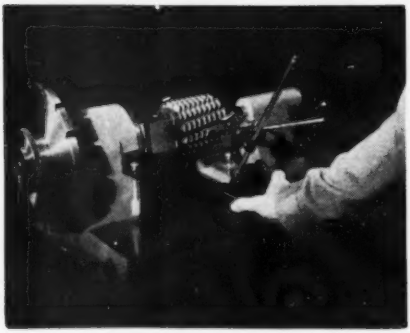
The No. 1½ is constructed with vee ways on its ram with triple lubrication, just as the larger Press-Rite models. The standard stroke is 2", but longer strokes up to 3" are available if required. The flywheel is 20¼" in diameter, weighs 190 pounds and reaches a speed of 160 r.p.m. with a ¾ h.p., 1140 r.p.m. motor. The bolster area is 10" x 14⅜". The distance from bolster to slide (stroke down, adjustment up) is 6¾". It has a 5½" throat depth.

This press occupies a 23" x 26" floor space and weighs (less motor) 1100 pounds.

B-C Hob Sharpening Checker

Barber-Colman Company, Rockford, Ill., is announcing a new Hob Sharpening Checker for measuring inaccuracies in hobs or formed cutters due to face sharpening. This precision instrument inspects radialism, flute-to-flute spacing, total spacing, face offset and accuracy of

straight flutes with the axis of hobs and cutters. It may also be used for checking runout of faces and outside diameters of hubs as well as the o.d. runout of the hob or cutter itself. Hob sharpening departments can now measure the exact



amount of error in sharpening—all guesswork and waste set-up time can be eliminated, Barber-Colman engineers state.

This new Hob Sharpening Checker is designed to utilize the standard index plates of the Barber-Colman No. 10-12 Hob Sharpening Machine. These plates are 9½" in diameter and index is held to ±.0005" adjacent, and ±.0015" total error. Special precision plates are available with adjacent spacing error of only ±.00025" and non-adjacent error of ±.001". Because of the larger diameter of these index plates, all error at standard hob diameters is eliminated for inspection purposes.

Checking is done by means of an indicator mounted on a surface plate. The indicator finger is set on the exact centerline by means of a gage block mounted on the index head. For checking negative and positive rake angles, there is a micrometer built into the head so that the indicator may be set off center. An alignment bar on the surface plate guides the indicator stand so that it may be moved at right angles to the axis of the hob when checking the faces of helical gash tools.

Toggle-type mechanisms are utilized for both the index plate pawl retractor and the tail stock center lever. Extra heavy construction provides rigidity for checking large hobs and cutters and maximum resistance to vibration, shock and wear.

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Two Vee Blocks & Two Clamps ←

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Cast Iron 2" x 1½ x 1½
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PIN VISES

#121	0—.040 —	$ .75 Each
#122	.030—.062 —	.75 "
#123	.050—.125 —	.85 "
#124	.115—.187 —	1.00 "

#110 Pine Vise (open jaw type) ⅜ Cap. **$2.00**
#130 Pin Tongs — 0—.064 (set of 3) **$2.50**

#100B SURFACE GAUGE — $6.00
Case hardened base
Two spindles — 4" & 7"

#101B — $9.00
Same as above, but with 9" & 12" Spindles ←

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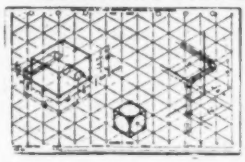

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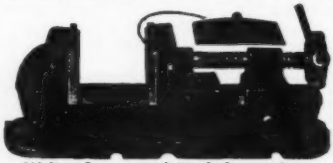

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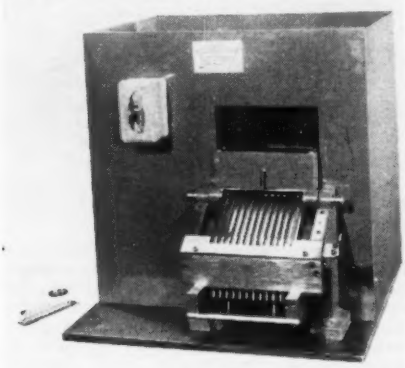
Automatic Hopper Feeds

The new Reynolds oscillating type hopper feeds, introduced by Cook & Chick Co., 640 S. Miller St., Chicago 7, Ill., are adaptable to production jobs which require the feeding of small articles, such as screws, rivets, nails, pins, washers, nuts, screw machine parts, die castings, molded parts, etc. The units can be used individually to load assembly fixtures, or incorporated into set-ups which use standard or special assembly equipment.

The Reynolds hopper is said to be especially suitable for jobs requiring the feeding of more than one part at a time, or where more than one kind or size of part is used in the same assembly, since provision can be made for feeding almost any number or combination of parts simultaneously, thus simplifying many tedious and expensive hand-fed operations, and making it possible to increase production with lower labor costs.

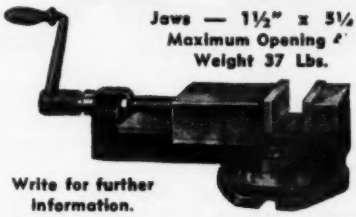


The hopper illustrated is set up for feeding twelve shoulder terminal pins simultaneously into an assembly fixture. The pins are poured into the hopper and are fed onto the inclined tracks from where they are released into tubes leading to the fixture by means of an escapement bar at the lower end of the track. Provision is made for blocking off each track individually so that pins can be fed in any combination desired.

The oscillating type hopper is equipped with an exclusive self-clearing gate for fast, continuous feeding. The units are built to meet the user's exact requirements for feeding from one to fifteen pieces simultaneously, as required. They are made with roller bearing construction throughout.

NEW BRITAIN

SWIVEL VISE



Jaws — 1½" x 5¼"
Maximum Opening 4"
Weight 37 Lbs.

Write for further information.

The body is made of semi-steel; the jaws of tool steel hardened and ground. All working surfaces are ground. The vise is as accurate as is possible and the degrees are cut to very close limits.

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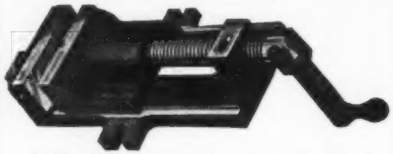
YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with specio and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	3½	12½
2D	5	5½	23

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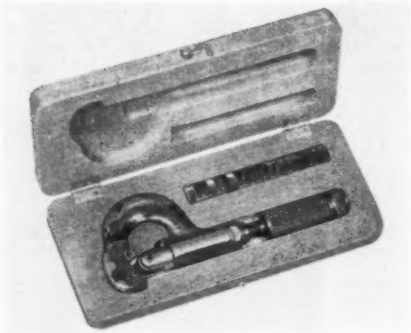
Wade Hand Knurling Tool

The Wade Tool Company, Waltham, Mass., has developed a "two-way" knurling tool for hand use, designed for the easy knurling of long or slender work which would bend under normal knurling pressure.

The principle behind this tool is that it is built like a steady rest. Two of the knurls revolve on stationary centers at the back of the work, and the third knurl is adjusted by means of the screw handle. To operate, the adjustable knurl is backed off so the tool may be placed over the work, then it is screwed into the work, under great pressure, by turning the handle.



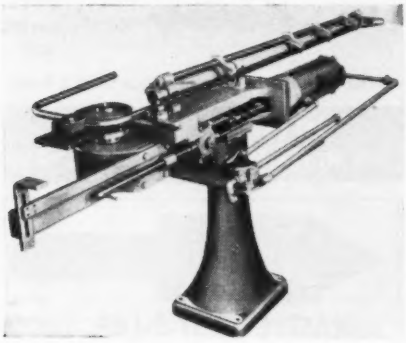
New features claimed for the tool, and causing it to be called a "two-way" hand knurling tool, are that it can be operated in a stationary position, to make a narrow band of knurling, when all 3 hex sockets are on the same side; it embodies an "automatic feed" feature so that by swivelling the knurl to a very slight angle, it travels along the work when the hex socket in the plunger is on the opposite side from the 2 hex sockets in the head of the tool; the knurl pins are socket head screws, made to screw in place with a hex key wrench for easy removal and replacement.

The micrometer-type frame is a case-hardened steel forging. The tool is 7" over-all, has a work diameter capacity of ¾" maximum and 3/32" minimum. Knurls are ½"x3/16", with a 3/16" diameter hole, and are made of an alloy tool steel, selected for extreme toughness and hardness. They are available for either straight or diamond knurling patterns—in 4 pitches ranging from .019" fine, to .045" coarse.

"Bend-Ex" Air Powered Tube Bender

Up to 1000 bends per hour of one-inch, 16-gage steel tubing are now possible on the new, improved "Bend-Ex" Bender manufactured by Paul Machine Tool & Die Works, 4600 S. Kedzie Ave., Dept. 0-1, Chicago 32, Ill. The unit's new, fully automatic die-and-clamping-head which grips and bends tube stock automatically has doubled the machine's production.

The operation of the "Bend-Ex" has been simplified to three quick steps. Unskilled personnel has been able to achieve maximum use of the Bender within a few hours. The machine is adaptable to all bending operations, whether round, square or rectangular tubing—pipe, light angles, channels, solid bars, etc. Because the unit is operated with air compression, maintenance is kept to a minimum. There are no hydraulic parts, clutch, brake or motor to wear out. As high as ten bends

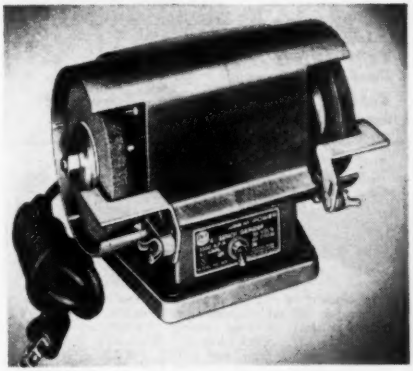


are possible on a single tube. Interchangeable dies are available for different size tubing diameters and radii; they can be easily and quickly attached, according to the manufacturer.

Portable Bench Grinder

A new compact, streamlined, portable bench grinder has been announced by Portable Electric Tools, Inc., 320 West 83rd St., Chicago 20, Ill. Known as Model 400 Hi-Power Bench Grinder, this new grinder incorporates such design features and conveniences as: fan-cooled, 110-120 volt, single-phase, 60-cycle, 3500 r.p.m. motor with precision, dynamically balanced rotor for smooth running; two adjustable tool rests; convenient on-off toggle switch built into the front of the motor housing; streamlined, lightweight, die-cast motor housing with integrally cast wheel guards, and base with no-creep rubber feet.

The grinder is finished in baked-on enamel and is supplied as standard with two balanced, vitrified grinding wheels, 4" in diameter by ½" face (one fine and one coarse) and a 6-foot, rubber-covered cord and plug.



This bench grinder is available also as a package with an adapter and drill chuck, buffing wheels, sanding discs and polishing bonnet and wire wheel brush for buffing, drilling, polishing, sanding, and brushing.

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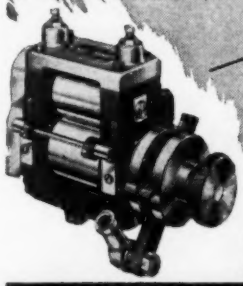

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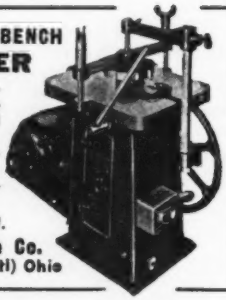

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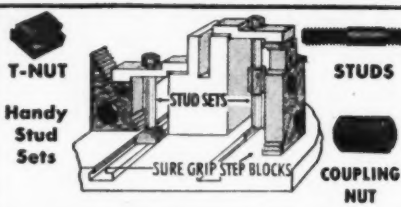

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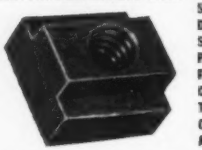

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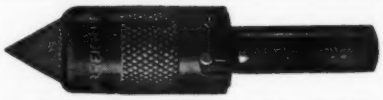

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Saves time, eliminates diamond dressing. Cones hanged in seconds. Available in 2 sizes ½" and ¼" Cent-R-Laps and abrasive Cones.

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for all HARDNESS TESTING, Throat 4", Gap 10", Wt. 27 lbs. — ACCURATE

Puts actual load of 3000 KG on 10 mm. ball.
Test head removable for testing very large parts.

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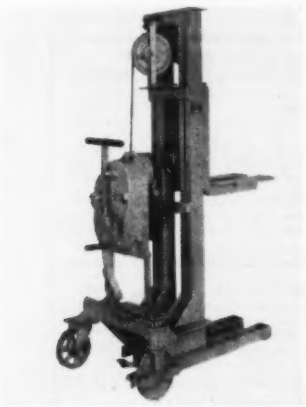
DAYTON ROGERS MFG. CO.
Minneapolis 7, Minn.

Portable Pallet Elevator

The illustration below shows a fork type Portable Pallet Elevator, designed for double and triple-decking of single-faced pallet loads, including strip steel and tin plate. It provides a piece of equipment introduced by Barrett-Cravens Co., 4609 S. Western Blvd., Chicago 9, Ill., for multiplying storage capacity and conserving floor space.



The operation requires a minimum of time and physical effort. The operator guides the forks (lowering height 3½") under the pallet and cranks the load up to the desired height. He then runs the elevator up to the load resting on the floor. Opening the brake lowers the pallet load gently onto the load below it.

The unit is for double-decking only and has no hinge. Its overall height is 6'6" and its lifting height 4'2". For triple-decking, this elevator is built with any lifting height required, and has a hinge which permits the unit, when collapsed, to pass under overhead obstructions.

Hand or electric operation is available for these elevators. The hand-operated unit has two speeds, governor control, and spur gears enclosed and running in oil. The electric model is ball bearing type, and has cable control, electric solenoid brake, thermal overload switch, top and bottom limit stops, and 25 feet of electric cable.

With this elevator, pallet loads can be tiered tight against each other. Capacities of 2000, 3000, 4000 and 5000 lbs. are available.

SPECIAL PRICE ON

WOODRUFF KEYSEAT CUTTERS, SHANK TYPE, H.S.S.

Number of Cutter					
*Amer. Stand.	Old Stand.	Diameter	Width Face	Length Overall	Our Price
...	201	¼"	1/32"	2 1/16"	$2.80
...	206	5/16	1/32	2 1/16	2.80
...	207	5/16	3/64	2 3/32	2.80
...	211	3/8	1/32	2 1/16	2.80
...	212	3/8	3/64	2 3/32	2.80
...	213	3/8	1/16	2 1/8	2.80
204	1	1/2	1/32	2 1/16	2.24
304	2	1/2	3/64	2 3/32	2.24
305	4	5/8	3/64	2 3/32	2.24
404	3	1/2	1/16	2 1/8	2.24
405	5	5/8	1/16	2 1/8	2.24
406	7	3/4	1/16	2 1/8	2.48
505	6	5/8	5/64	2 5/32	2.24
...	61	5/8	1/16	2 1/8	2.24
506	8	3/4	3/64	2 3/32	2.48
...	91	3/4	1/16	2 1/8	2.48
507	10	7/8	5/64	2 5/32	2 72
606	9	3/4	1/16	2 1/8	2.48
607	11	7/8	1/16	2 1/8	2.72
...	12	7/8	3/64	2 3/32	2.72
608	13	1	1/16	2 1/8	3.04
...	14	1	3/64	2 3/32	3.04
...	152	1	5/64	2 5/32	3.36
609	16	1 1/8	1/16	2 1/8	3.36
807	A	7/8	1/4	2 1/4	2.72
808	15	1	1/4	2 1/4	3.04
...	17	1 1/8	3/64	2 3/32	3.36
809	18	1 1/8	1/4	2 1/4	3.36
...	19	1 1/4	1/16	2 1/8	3.68
...	20	1 1/4	3/64	2 3/32	3.68
810	21	1 1/4	1/4	2 1/4	3.66
811	22	1 3/8	1/4	2 1/4	4.00
812	24	1 1/2	1/4	2 1/4	4.40
1008	B	1	1/16	2 1/8	3.20
1009	C	1 1/8	1/16	2 1/8	3.52
1010	D	1 1/4	1/16	2 1/8	3.92
1011	23	1 3/8	1/16	2 1/8	4.32
1012	25	1 1/2	1/16	2 1/8	4.72
1210	E	1 1/4	3/16	2 3/16	3.92
1211	F	1 3/8	3/16	2 3/16	4.32
1212	G	1 1/2	3/16	2 3/16	4.72

WOODRUFF KEYSEAT CUTTERS ARBOR TYPE, H.S.S.

No. of Cutter	Nom. Diam.	Face Width	Hole Size	Our Price
26	2 1/8"	1/4"	3/4"	$4.72
27	2 1/8	1/4	3/4	4.88
28	2 1/8	5/16	3/4	5.12
29	2 1/8	3/8	3/4	5.44
R	2 3/4	1/4	1	5.92
S	2 3/4	5/16	1	6.32
T	2 3/4	3/8	1	6.64
U	2 3/4	7/16	1	6.88
V	2 3/4	1/2	1	7.20
30	3 1/2	3/8	1	8.64
31	3 1/2	7/16	1	9.12
32	3 1/2	1/2	1	9.52
33	3 1/2	5/16	1	10.32
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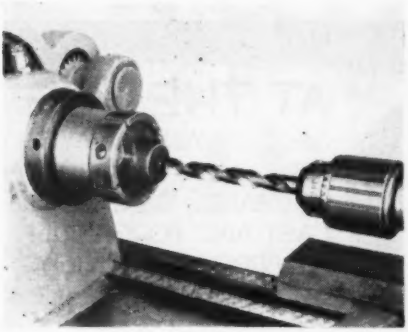

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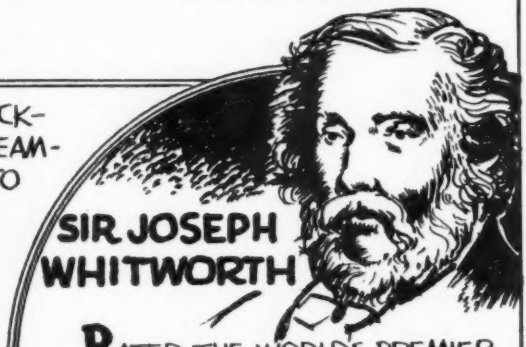

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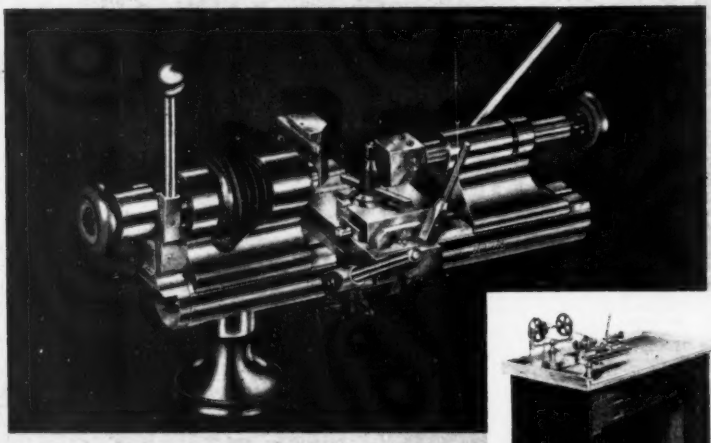

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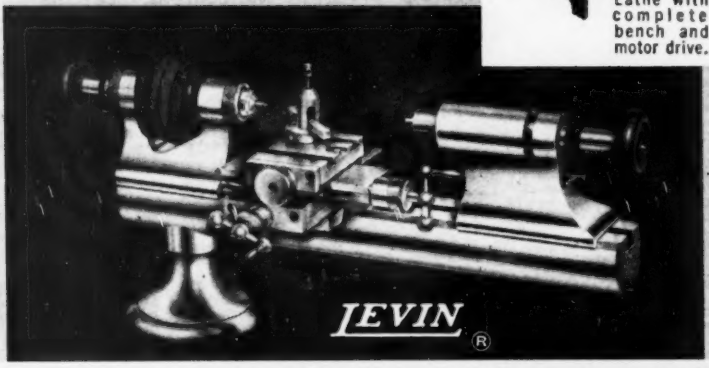

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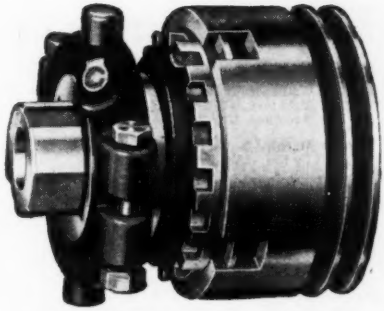

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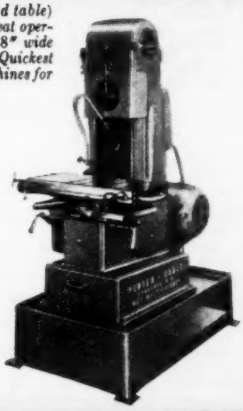

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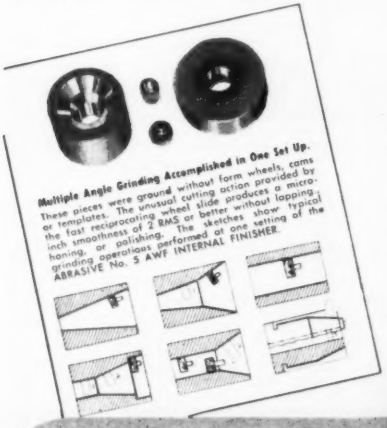

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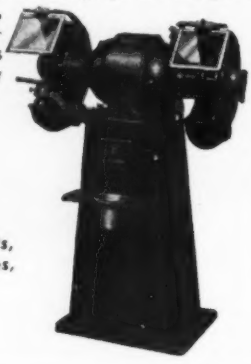

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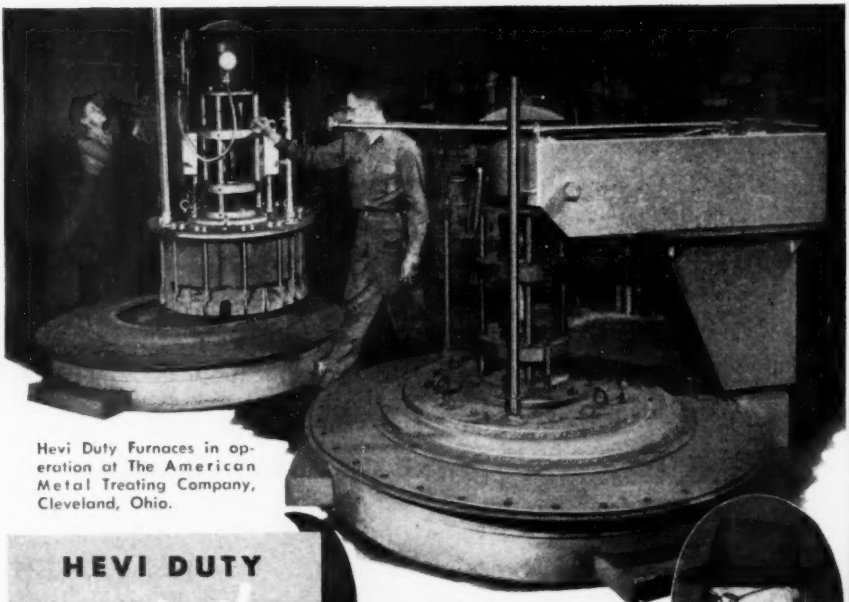

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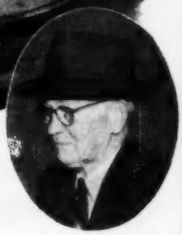

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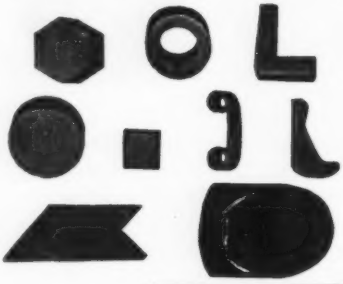

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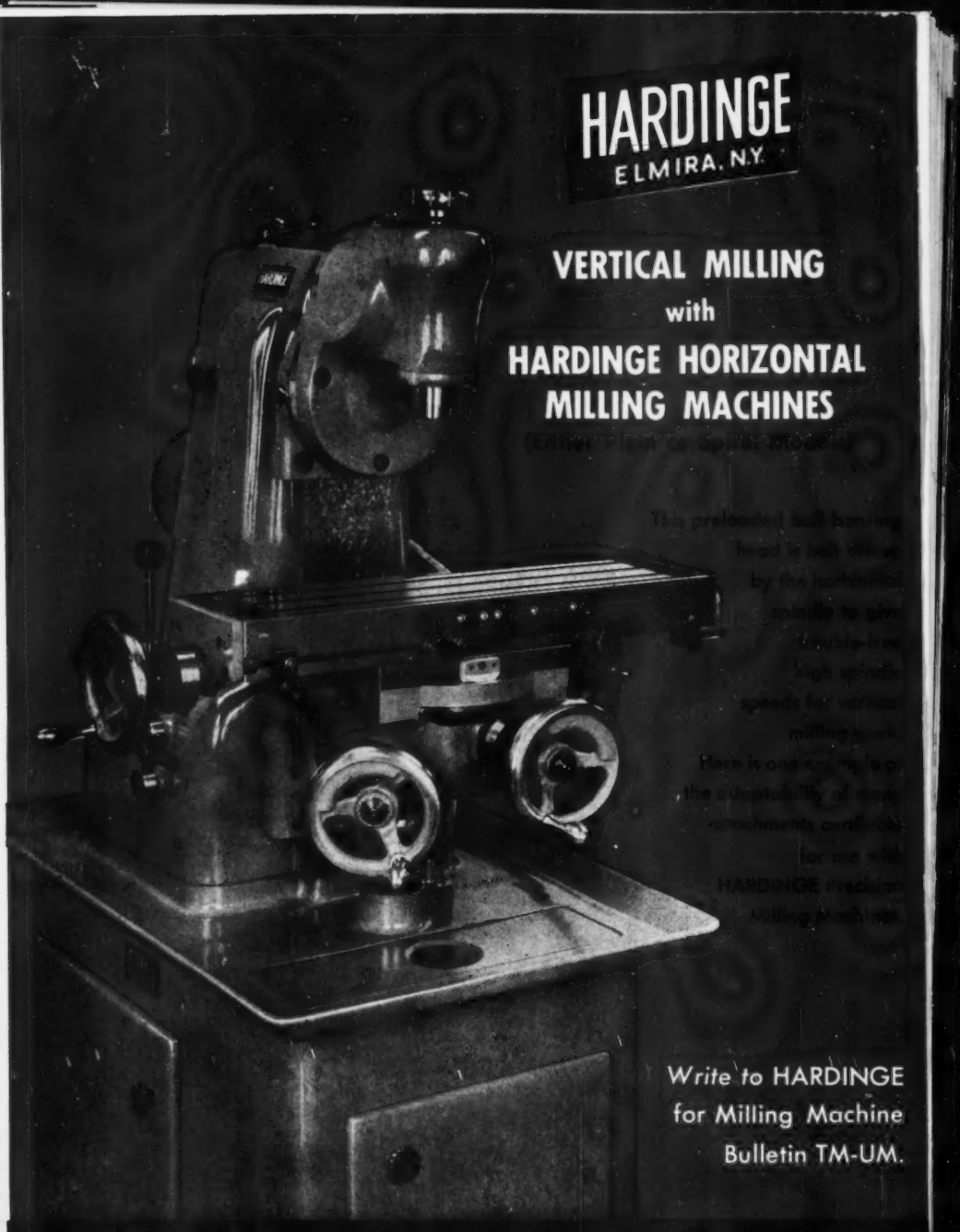
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